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MILITARY TOPOGRAPHY.

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PART I.

THE Council of the Royal United Service Institution have done me the honour to invite me to give a lecture on Military Topography, and I must admit that I feel some little difficulty in approaching this subject, inasmuch as I have not only published various books and pamphlets on most matters connected with military topography, but have, during the last year, given two lectures before the Irish Military Society, which have been printed and had some circulation. Thus it is that I have nothing new to say about military topography, so far as regards new methods or appliances for sketching, since I last lectured on it, and, in consequence, I shall to-day simply reiterate my views as to what I believe to be the proper course of instruction for our officers in this most important branch of military art. But I shall do so with the more confidence, for not only are there signs that public opinion has been awakened on this subject, but further, because I have very good reasons for believing that what I have always said, and said again last April, as regards the system of instruction hitherto adopted in our army, has not been entirely without result.

In recent years the processes of scientific surveying, more especially as regards *rapid* work, have advanced enormously, and it is my object to-day to show how the rougher processes, commonly styled "military sketching," have likewise made great strides.

Before launching forth into the subject I cannot too strongly insist on the wide difference between *military surveying* carried out with scientific and elaborate instruments, generally of considerable weight and bulk, used with due care and without hurry, where an error of a few feet is considered careless work and where the essence of the work is absolute accuracy, and *military sketching*—the rough-and-ready work done sometimes even without any instruments, or, at best, with portable or easily extemporised ones—carried out in as rapid a manner as possible, where a hundred yards error more or less is immaterial and where the essential factor is *time*.

I do not intend to-day to deal with the recent developments in scientific surveying; they are essentially the affairs of our trained surveyors. To those interested in this branch I would recommend an admirable little work styled "Preliminary Survey and Estimates," by Mr. Theodore Gribble, C.E., one of the "Text Books of Science" series.

I start, then, with this postulate, namely, that we want to train our officers to a sound knowledge of military topography, and to be more or less expert in military sketching—I say more or less with intent, for I thoroughly disbelieve in making, or rather in trying to make, all men artists; I simply refuse to admit that the value of the work produced by some men who have no natural turn for using a pencil is in the least degree commensurate with the time and trouble spent by them in attempting to learn to draw.

Let us, before going any further, clear the ground by asking ourselves the *object* of teaching men this "military topography." The answer is obvious enough, and may be broadly given as follows: (1) to give them a tactical knowledge of ground, (2) to enable them to make full use of existing maps, (3) in some few exceptional cases to teach them to make a rapid reconnaissance sketch and report of a road, river, or, very *rarely*, of a position.

It is obvious that the first two are absolutely essential, and are daily and hourly required by all soldiers, whereas the third is, at best, only a possible eventuality.

Now for many years the be-all and end-all of instruction in military topography has been to force every officer, no matter how helpless he might be with a pencil, to "make a sketch" with a prismatic compass sketching case, protractor, and clinometer.

I am, of course, aware that of late years the cavalry sketching case has also been taught at our educational establishments.

In addition to this delightful occupation of making a sketch which he, the operator, well knows will probably be absolutely of no use to anybody—a melancholy satisfaction at best—there has been, and is, a theoretical examination, without passing which no man can ever expect promotion. This entails the solving of various problematical and, generally speaking, extremely unlikely conundrums, commonly based on some person having foolishly or carelessly made a map with no scale on it, or on conveniently finding a "dead Russian officer," who had obviously with malice aforethought, before he was shot, stuffed his pockets with maps, which neither he nor anybody else could possibly have used, and which were clearly intended solely to annoy and irritate British officers attending garrison classes and other examinations. As regards the first part of this course—the prismatic compass sketching—whenever I have raised my voice against this supposed infallible process and pointed out the small benefits derived from it, I have been met with the reply: "Granted that we do not expect to succeed in making many men draw, but still it is the best way to make them study ground, and so appreciate its value for tactical purposes." Here I join issue at once, for it is easy to demonstrate that this prismatic compass sketching is the most

laborious and the worst possible way of giving men a tactical knowledge of ground, since 19 out of 20 who attempt it are so engrossed in the processes of shooting angles, and subsequently plotting them, that all ideas of the "general run of the ground" they are working on, for tactical purposes, are inevitably forced into the background. Secondly, the process in no way whatever teaches map-reading; and lastly, it is a most indifferent way of making a reconnaissance sketch, as I shall proceed indisputably to show. Destructive criticism is, as we all know, easy; it is, therefore, my task to show what better methods are at hand.

I will start with the first and most important object of military topography, namely, to inculcate a tactical knowledge of ground, and briefly outline the method of instruction which experience has proved to me (and, I am sure, to many others before me) to be the most effective. To give the first instruction in this, a large scale shaded and contoured map of some accessible bit of ground, such as this one of Dover, should be fixed on a plane-table and taken to the portion of country it represents. Here the table should be "set," and various objects identified. I will not waste time in going through this obvious course of professional instruction, but content myself by saying that, by degrees, a man can be shown how to find his place on the map by the various processes of resection, and how to set his board with and without a magnetic compass; also how to estimate and measure, by scale or extemporised scale, such as the span of one's hand, &c., the distances of various objects, and perform for his own information, and actually in the field, for practical purposes, the various processes, such as determining the visibility of points, which for years have been considered to be in the exclusive domain of theoretical examinations.

The next step is to supply a map with certain omissions, and get the student to fill them in—working plane-table fashion. From this more advanced stage of map-reading or map-revising to making a rough plane-table sketch is so easy a transition that few men would realise the exact point where they had ceased to read a map—and commenced to make a map.

All this time the process of studying ground, its shapes, and folds and slopes, would have been going on almost without effort.

As to grasping the subject of contours—any 6-in. Ordnance map showing 100-ft. contours can be fixed on the plane-table, and four 20-ft. contours interpolated, roughly by eye, at first by the instructor and subsequently by the student, and I have found from experience that this process teaches a tyro more in one day than he would learn in a fortnight, striving to contour a probably most defective and unrecognisable sketch of his own.

The mere habit of following with the finger on the map, and the eye on the ground, a well-run contour gives a man a good idea of reading a contoured map.

For good tactical study of ground, nothing can equal the plan of issuing hektographed tracings of a 6-in. map, showing some fairly

marked defensive position, and repairing to the ground thus delineated and checking the map well over, interpolating rough 20-ft. contours, and marking in roads, fences, &c. Finally, selecting positions to be held by a small force of infantry and artillery, and marking on the map any shelter-trenches, gunpits or epaulements, or other defensive measures considered suitable.

To make the study complete, arrangements should be made to attack the same position, and a rough report furnished of the dispositions for the attack.

Having got to this point, I would stop so far as concerns most men, since they have only then to practise using small scale maps *on* the ground and *off* the ground to perfect themselves in the two main essentials of *military topography, viz., a* study of the tactical value of ground and the general use of maps.

To those who aspire to sketch, I would go on with a regular good course of plane-table work, followed by a course of sketching with a board and no tripod, plane-table fashion, *with* or *without* a magnetic compass, and ending, of course, with sketching on horseback with a cavalry sketching case.

By this system of *instruction a man is gradually, but slowly* and surely, given a sound practical knowledge of ground, the use of maps, and, *when required, of the only* class of sketching wanted on active service.

Now, with regard to the prismatic compass. It does not teach the study of ground in the way I have just described, because it is disconnected with map reading. It is a feeble understudy of the principles of trigonometrical surveying, which *latter* do not concern the great mass of officers.

The advantages which the prismatic compass is supposed to monopolise are portability and secrecy, but in the exceptional cases where only rough notes can be taken of a country and "bearings" entered in a pocket-book, by far the best and most practical way is to use a common magnetic compass of the watch pattern thus (exhibited). This compass has a small index marked on its edge, and, when held in front of the breast, the magnetic bearing of any object can be readily taken with sufficient accuracy without attracting attention, either on foot or on horseback. This is no theory, but is the outcome of solid experience, and was used with the most absolutely satisfactory results by Colonel Mark Bell, V.C., R.E., in his adventurous ride of 800 miles through Asia Minor.

But in this class of rough reconnaissance, as indeed with *all exploration work* not carried out with surveying instruments, the inevitable errors in a day's work should, where possible, be checked by astronomical observations by night. It is here that a knowledge of the stars and proficiency in the use of the sextant and artificial horizon is so useful. Colonel Bell thus checked his work in Asia Minor (working at the rate of 25 miles a day—the rate of advance of his caravan) with a result of an error of only ten miles in longitude and *nil* in latitude, and this in 800 miles!

I need hardly dilate upon the value of a reliable aneroid for ex-

ploration or reconnaissance work. With this small instrument, which has a magnifying glass forming part of the protecting glass surface, I have frequently read differences of level in a day's work of near 3,000 ft. to within 10 ft. of the corrected heights.

I freely admit that, under some exceptional circumstances, a prismatic compass is of great use to an explorer—thus, to note the changes in direction of a winding river amongst mangrove swamps—or to take long shots at very distant landmarks. But I object to a soldier being expected to carry an instrument which can only be considered as superior to a good magnetic compass for very exceptional purposes. The watch compass will do the ordinary work well enough, and when it is required to "observe and record bearings" an ordinary magnetic compass can be easily made to do this work with all reasonable accuracy. Here is my own compass which by means of a slit in the lid as a "foresight" and a notch in the handle as a "backsight," and by a saucer-shaped card of aluminium clearly engraved along the edge, enables bearings to be taken near enough for all military purposes. In every instance in which I have thus introduced innovations, I have, before advocating them, assured myself from practical experiments that they were *sound*. That diagram (indicated) will show you this compass can be used by any officer to take a bearing with sufficient accuracy.

But where secrecy is not of vital importance, it is unquestionable that by far the best reconnaissance sketches and most comprehensive reports can be done by working direct from nature, "plane-table fashion," with a "cavalry *sketching* case." The reason is simple enough, for the actual features of a country, as seen before the operator from hour to hour and day to day, are then and there drawn on his board as they successively come under his observation, and such work must always be as infinitely superior to prismatic compass or even watch compass data entered in a book and subsequently plotted, as is a portrait from life superior to one done from written notes descriptive of an individual.

Part II.

I shall now deal with the successive steps by which military sketching is advanced from the elementary stages to those processes most suited for active service.

Of course we start with the class of sketch done on foot with a plane-table or with a board and no tripod, and with or without a magnetic compass, in which either a base is paced or measured with a range-finder or a succession of traverse lines are paced. This is the A B C of military sketching, as we all know.

Where a plane-table is available with a good trough compass and long sight-vane such as this one (exhibited) there is hardly any limit to the accuracy of the work which can be turned out. Failing a regular table, a capital cheap form can be knocked up by means of a piece of board fitted on a light stand, such as this French camera-stand which only costs 7*s.* or 8*s.* altogether. Or again, a tripod of

this description (exhibited) is admirable, since it can be levelled by means of the wooden eccentrics at the top of each rod.

For a plane-table top, this roll-up board is a good and portable substitute, and the paper can be fixed on it by means of the metal clamps which serve to hold it rigid (exhibited).

When no regular sight-vane like this (exhibited) is available, this small pocket one will be found to do all that is required for military sketching (exhibited). It has a small compass in it and also a rough clinometer with which the angles of elevation or depression may be noted, also profiles of hills taken. This diagram (indicated) will show you the amount of accuracy obtainable with this little instrument—not very great as you see, but quite *near enough* for our work.

I call that small instrument the *complete sketcher*, since it embodies four separate functions usually performed by four separate instruments, viz., compass, clinometer, sight-vane, and protractor.

When all else fails and you are without any instruments, good and accurate work can and has been done with a top of a biscuit box as a board, three rods and a ring off a head collar, for a tripod and a sight-vane ruler made out of a strip of wood into which is stuck a pen nib and a pin (exhibited).

Now let us advance a short step and work in plane-table fashion with a board held in the hand, *thus*. Here, in order to set it without laying it down, and looking out for a fixed station, a compass is invaluable. With a compass such as this one of mine (exhibited) furnished with a slit in lid and notch in handle to adjust it on a meridian line drawn on the paper and with a *friction ring* below to prevent its sliding (exhibited), much good and rapid work can be done.

For smaller rough sketches done in this fashion nothing can equal a pocket book of *decent* size, ruled in squares and with a small compass inserted in the drawing block thus (exhibited): this one is of waterproofed Willesden paper of a light green colour. Besides its capacity for resisting wet, it is a great comfort to the eyes when working in bright sunlight. Some years since I was completely put out of action for a time—not abroad, but in Kent—after sketching for six or eight hours on a white piece of paper in bright sunlight.

Next we come to working on horseback with Colonel Richards' cavalry sketching case. In using the sketching case, the directions of objects are observed by a straight-edged ruler working under a band, or by an attached ruler as here shown (exhibited). Here is one of Colonel Richards' original boards: it is the one with which all these extended reconnaissances in Nubia, and the Soudan, were carried out, and I would like to say here that no man has done more for advancing practical military sketching than has the inventor of this board. It is no exaggeration to say that, without its aid, none of that work (exhibited), and much more like it by others, would possibly have been done at all. There are very many different sorts of cavalry sketching cases at present made. This board (exhibited) is my own particular pattern. It has an attached ruler of simple construction and capable of universal movement in the plane of the

board and also a clinometer on the back, which latter I first introduced about 1887. I understand that it has been found to be useful and that the Royal Military College contemplate adopting it, or something very like it. Various patterns of the attached ruler have been tried by me and others, and this one is perhaps the simplest and most effective, but for more expert sketches there is a vastly superior plan which I shall describe later on. For more careful work the cavalry sketching case can be used dismounted as a small plane-table.

In order to train cavalrymen, or reconnoitring officers, "how to observe and what to report," nothing can equal the system of "skeleton routes," which I believe I first introduced at Shorncliffe, in 1886, and which has since produced much good work.

An enlargement of an existing map is made to a scale of 2 in. to 3 in. to a mile, showing simply the route to be followed and a few landmarks such as cross roads, rivers, and railways. Such a map is put on a cavalry sketching case, and the line indicated by it is ridden and the skeleton route filled in with all details, such as widths of road and lateral roads and other useful information, especially tactical information. At the end of a day's ride these rough notes enable a good report to be made in a systematic manner. The practical advantages of this system of instruction are (1) a man is relieved from constantly observing and drawing in changes of the direction of the road, (2) he is not incessantly engaged in counting his horse's paces, and (3) being clear of these two vexatious mechanical processes, he is able to work far quicker and consequently cover treble the amount of ground in a day, and (4) this gives him an enormous amount of practice at seeing and reporting on a new country and thus training him. It is a class of so-called "sketching" which might properly form the climax of the system of map reading and the study of ground for tactical purposes which I so strongly advocate, and might really be scheduled under those heads. I have often and often taken out good men who could not draw at all, and who at the end of a day's ride of 20 to 30 miles have assured me they have learnt more in that day of the tactical importance of ground, such as selecting good outpost lines, or suitable positions for small rear-guards or advanced guards to occupy, than in all their previous career. The best example on record of this class of work is a reconnaissance from Shorncliffe to Woolwich, carried out by a party of the 14th Hussars, in two days. The return journey of over 60 miles being performed on the third day, and the sketches and reports given to Sir Baker Russell the same day at 7 P.M. A very real difficulty on service is often to get such work finished up owing to the light failing. Here is a useful aid in such an emergency. It is an eminently portable pattern of lantern, which was brought from the Tyrol by Colonel Howard, of my regiment, and which he informs me is much used by the hunters there.

For regular sketching on horseback the distances are measured by the horse's paces, either from a special scale, constructed beforehand, or, in ordinary cases, by using an eminently simple method which I

introduced some years since, and which I style the "penny ruler system." Having ascertained the number of rises in the saddle you make whilst your horse covers a mile, you proceed as follows. The average paced horse makes between 540 and 600 "double trots" in a mile, and supposing yours is 584, you can take the ruler and call 600 trots equal to 1,800 yds. Thus, to make a sketch at about 3 in. to a mile, each inch can be taken as 200 trots or 600 yds., and each $\frac{1}{4}$ in. as 50 trots or 150 yds., and there you have your scale. This diagram illustrates this method, and these sketches by Quartermaster W. D. Short are admirable examples of what can be done in this line.

The next step in advance is to sketch on horseback "by time." Here the rate of advance must be known, and suppose it to be 2 miles an hour, to sketch at 2 in. to a mile, $\frac{1}{2}$ in. on the foot rule will represent a $\frac{1}{2}$ mile of country, or 15 minutes' march. This is the most practical and most generally useful class of sketching. This diagram is an example of this class of work.

This long map is the route from Wady Halfa to Dongola, about 240 miles or so of river.

Those maps there (indicated) represent Sir Herbert Stewart's march across the Bayuda Desert, all the detail there shown was done exclusively by "time," based on the rate of advance of the column, and given to Sir Herbert at the end of each day's march.

A very convenient aid for sketching in this manner is shown on this diagram of the "traversing pencil," which is fitted with a couple of wheels; one acts as a roller, and the other, the toothed wheel, marks off equal intervals as it runs along the paper, and by aiming the pencil at a distant object, and pushing it forwards (thus), the exact direction is also indicated on the paper by a series of dots, Every fourth dot is double, and, supposing it to be taken to show a division of 100 yds., the other dots will be at 25 yds. interval. It immensely simplifies the process of sketching on horseback, for, however unsteady a horse may be, you can always get a shot with it in a tenth of the time taken to adjust a ruler. For time sketching, each dot can be called five minutes' march, and every fourth double dot 20 minutes' and 12 dots one hour. This gives a scale of 3 in. to one hour's march.

This system of "time" sketching can be used under various conditions. Here, for example, is a river sketch made from the "Safia," one of General Gordon's steamers, and represents 10 days' work on a portion of the Nile, between Metemneh and Khartoum.

Time will not admit of my further illustrating this branch of topography, but I trust I have demonstrated how, starting with the plane-table, the same system can be successively and successfully adapted to all and every condition of active service, and eventually enable work of that description to be done with the greatest ease under what I venture to think were, taking into consideration the amount of fighting and marching which had to be done, to say the least, hardly "favourable conditions" for military sketching.

Part III.

I will now deal with a branch of the subject of Military Topography which has of late years attracted considerable attention—namely, night operations. For the successful conduct of these, a good practical knowledge of the use of the magnetic compass, and also of the "general movement of the heavens," as it is styled, are indispensable. I will not to-day enter into the tactical aspects of this class of work, beyond remarking that no matter how skilled or successful a man may be at guiding troops at night, good staff arrangements for keeping the following body of troops in good order and prevent straggling or confusion are absolutely vital.

No amount of good leading will atone for bad following; this has been proved over and over again.

Now as to the leading.

The system I advocate is one of adjusting a movable index-bar or meridian line on top of a compass, to indicate the magnetic bearing of the required line of advance, as shown on a graduated collar *outside* of the compass. On this model the graduations are thus shown. The compass card is prepared with luminous paint, and a line of the same is painted on the lid. When the black north point (indicated), which shows up well on the massed luminous paint on the card, swings and remains under the black index bar, the luminous white line points like a finger in the required direction. This gives a good definite line to move on, and one capable of being prolonged. For example, you want to go N.W. You adjust the index to that point on the external graduated ring, and, placing the compass in the palm of your hand, held in front of you, turn round your whole body, until the N. point and index coincide, when they do the luminous line points N.W.

It is generally easy to tell if an invention is a success, by the fact that it is sure to be adopted by some other "inventor," and this has been the case with this system of setting the luminous line as advocated by me. Up to date I have not heard from my various disciples; possibly I never shall.

So much for the compass, which has thus indicated the direction you wish to move in. The next thing is how to move in that direction. First, suppose it to be a starlight night, this is the best and easiest of all, and most accurate to work by.

It is an invaluable aid to know a few of the best marked star groups, such as Orion, Pegasus, &c., and also to have a good general knowledge of the so-called movement of the heavens—very easily acquired, by the way. Suppose, now, you look in the direction of the white line in your compass and note that it is pointing towards Orion's Belt. Your knowledge of the heavens will tell you whether that star group is rising, traversing, or declining at that hour, and this enables you to judge how long you can, with safety, march on that particular point. Roughly speaking, every 15 to 20 minutes it is well to take out your compass, halt, and take another bearing. As

Orion works to his right, you take some other convenient star, no matter the name, to the left of Orion, and so on; say, for example, later on you get on to Sirius and then on to some star to the left of him. The most convenient stars for this purpose are those whose altitudes are less than 30°.

When no stars are available, and especially if moonlight enables you to easily see the outlines of distant terrestrial objects, you select these and march on them as they successively present themselves on your sky-line, which, be it remembered, will constantly change if your course is through undulating and broken ground.

Lastly, you can get a pitch-dark night with clouds and rain. Here you must either halt and look at your compass every few yards, or, if possible, send on an assistant with a slab of luminous paint, at least a foot square, slung on his back (such as this). This is visible for about 100 yards, and after he has gone on that distance, in the direction he imagines to be the right one, he halts and you observe the true direction with your compass and, then moving up, place yourself on his right or left at where you roughly judge he ought to be, and so eliminate the error as you go along. It is slow work, but experience has proved its accuracy.

In a close country, with roads and fences, luminous maps are useful. You prepare a map drawn in thick lines on transparent cloth (exhibited) and place a slab of luminous cardboard below. To use it with effect, you must keep your dead reckoning by pacing between all cross roads or landmarks—this is most essential.

One last word on conducting night marches. The essence of success is careful reconnoitring by day and the exact recording of the magnetic bearing of the line of advance to the objective, and also of its distance in yards, this can generally be easily ascertained with a range-finder. Failing this, the next best process is to work off a good, reliable map, but such is not always obtainable.

Did time permit, I could give you many examples of long night marches I have carried out in various countries, but chiefly in the wilds of Southern Spain, when shooting or ornithologising, and upon which most of my deductions are based. I will only allude to one, the historical march after the battle of Abu Klea and before the action of Gubat in the Soudan. Here we marched upwards of 24 miles across a country totally unknown to us, through a dense scrub, which delayed us many hours and reduced our rate of advance to three-quarters of a mile an hour; and in spite of every difficulty, I had finally the honour of leading that column down to the Nile almost exactly opposite the point of the island which Sir Herbert Stewart had told me he wished to reach. I am concerned solely with the topographical aspect of the affair, that is to say, the leading. Taking into consideration the enormous difficulties of that task and the confusion which reigned amongst the thousands of camels which were supposed to follow, but which in many cases overlapped and encircled the front, and further remembering that there were no luminous compasses nor well-organised paraphernalia for simplifying the arduous process of leading that forlorn hope, if I may venture

to call it so, I shall ever look upon it as not the least successful part of Sir Herbert Stewart's daring march across the Bayuda Desert, and it will ever be the greatest pride in my life that I was permitted to bear a small share in that attempt.

Part IV.

I now come to my last topic, namely, the changes which recent inventions have exercised on the methods of carrying out topographical work.

It has always been an admitted advantage if a good pictorial representation of ground could be made in addition to mapping it. For this some advocate photography, but, much as that science has advanced in recent years, it does not exactly, so far, lend itself to the rapidity so essential for reproducing sketches. But there are unquestionably many instances in which the Intelligence Branch of an army in the field might derive much valuable assistance from the camera.

When a man is a quick freehand draughtsman a useful sketch can be knocked off in a few minutes. Here is one (exhibited) drawn and coloured on the spot before the action of Abu Klea, and here is the same enlarged to illustrate another matter. But many men cannot sketch quickly, and for them this invention, styled the "Philograph" (exhibited), might perhaps in some instances prove very useful. It is, I believe, the joint invention of an English lady, Miss Osborne-Moore, and a French artist. The difficulty would obviously be to carry it about. This is the most portable form at present made, The principle is absurdly simple, as I shall show, and the results incontestably good. The draughtsman places his eye at any convenient distance from the transparent pane of glass or sheet of celluloid, and, *keeping his eye steady* at that point, draws on the surface the outline of the objects he sees in the distance as projected on it. Anybody who chooses to stand opposite a window and look across a street can realise at once the process. It is extremely rapid, and the perspective is admirable. I have drawn groups of men, such as this group of the band of my battalion at practice (exhibited), and made highly complicated sketches of buildings in true perspective, mechanically, with its aid in a few minutes. Some modification or development of the system might be used with advantage by many people, including even expert draughtsmen.

But the instruments which have really revolutionized all the former processes of military sketching are unquestionably range-finders.

With a good reliable and, above all, portable and durable range-finder, an officer on service has a friend with him which, apart from its value for tactical purposes, will solve many of the most vexed topographical problems, and entirely eliminate the necessity of even considering many others.

For with the range-finder a suitable base line can be accurately measured between convenient points which subsequently will serve to

form plane-table stations, and all the old worries about "level ground," "no obstacles," &c., are banished in a moment and for ever.

The point to bear in mind is that even expert military draughtsmen do not aspire to pace 100 yards with a less error than 2 per cent., and on rough ground very often the 2 becomes 4 per cent. or more. Hence a base of 1,000 yards would commonly be paced as 950 or 1,050, whereas with a range-finder 980 to 1,020 yards could be reckoned on, and if several ranges were taken and the *mean* adopted, almost any degree of accuracy could be attained.

Here is a sketch of a large bit of country, representing a portion of a great plain, Laguna de la Jardan, in Andalusia, where I have shot and birdsnested off and on for the last 18 years. Last time I was out there shooting, on account of the unprecedented heavy rains all my favourite snipe bogs were under water, and sport was almost an impossibility. In consequence I had some spare time on my hands, and one day, from the house where I had established my head-quarters, I took the range of a distant *chosa*, or small farm, across this big lake. I then set up an impromptu plane-table, and got sights at all conspicuous objects within 10 miles or so. Later on, wherever I found myself before my time at any point, waiting for the geese and ducks to flight of an evening, I used to take the bearings of conspicuous objects with one of my magnetic compasses (used as a prismatic), and on my return to England this map was compiled by Quartermaster-Sergeant Short, R.E., representing about 24 square miles of ground. The base of 2,400 yards, combined with the plane-table rays, gave it an amount of "stiffening" which stood him well in working out some of my very rough data.

But unquestionably the most valuable use of a range-finder for reconnaissance purposes is to measure the distance between two distant objects which the reconnoitrer considers would best serve him as stations for plane-table work. The principle upon which this is done is very simple, and this diagram (indicated) will perhaps make my meaning clearer. Suppose the observer at A wants to ascertain the distance between the two conspicuous hill tops, E and F, with a view to using EF as a base line. He takes the range of E by means of a proportional base, AB, which is $\frac{1}{5}\frac{1}{0}$ of AE. Similarly he takes the range of F by means of the proportional base AC. Then without troubling himself about the distances of E and F from A, or measuring their bases, he simply measures from B to C on the ground, and BC will give him $\frac{1}{5}\frac{1}{0}$ of the distance EF, or if BC be 100 yards, EF will be 5,000 yards.

Now this admirable process is peculiarly the property of fixed-angle range-finders such as the Weldon, although some "adjustable" instruments can be manipulated so as to act as "fixed" instruments to a certain extent. But whereas the "fixed"-angle range-finder, as its name implies, must give the *true* angle, and in consequence the true transverse range, the adjustable-angle range-finder may be "adjusted" to the wrong "fixed angle," and hence may, and often does, give the wrong range! This is an insuperable objection

to all men who have practical experience of the two classes of instrument used in this fashion.

One common objection to the use of the Weldon is the difficulty of getting a "distant point" to work on. This can be altogether obviated by using it "double handed," as shown on this diagram of the wood and bridge below, in which case the transverse distance is 25 times the base.

Now, as to this double-handed range-taking with the Weldon, in order to simplify the process, I have here single prisms of 88° 51′ 15″ mounted separately with handles, thus, and with a couple of these, and *no other range-taking appliances*, the distance of any object up to the limits of human vision can be rapidly and accurately taken. In this process of reflecting one on another it commonly happens that ranges are taken "over," owing to a man's head affording too broad a mark to aim at. This difficulty I have overcome by teaching any non-commissioned officers engaged in taking a range to draw their swords and slip the range-finder over the ring of the cross-piece and to "recover swords." This provides a fine point with which to obtain coincidence with the reflected image of the object.

In the case of the single prisms I have had a small socket attached which fits into the ring on the sword thus, or into the muzzle of a rifle thus, for very accurate observations. (Explained.) I may add that these single prisms can be used equally well by a man working alone.

Reverting now to these diagrams, I would like particularly to direct your attention to the fact that such work would be impossible with instruments having adjustable angles and fixed bases, since they cannot thus, when used in the ordinary way, take transverse ranges between two distant objects. Of course, with *any* range-finder, such distances might be eventually worked out either by adjusting the angle to what is *believed* to be the correct "fixed angle," or by calculation, or again by plotting bearings on a sketch; but these makeshifts are beside the point.

But besides these methods of measuring thousands of yards for topographical purposes, there is another use for range-finders, and that is for measuring short distances such as the width of a river, across which it is wanted to throw a bridge. Now, when I talk of measuring short distances, I mean actually measuring them for military purposes, that is to say, within a yard, or even a foot, of their true dimensions.

This can be done with absolute certainty by our small friend the Weldon, by using the second and third prisms only, by which means a base one quarter of the range is obtained. Thus, supposing a reconnoitring officer reached the bank of a river with the object of ascertaining its exact width for bridging purposes, all he has to do is to plant his sword or stick, or better still, get a soldier to hold up his rifle, butt on the ground, about 20 or 30 yards from him; he then reflects any object on the far bank with the second prism, on the sword or rifle, and, *marking the spot*, retires on this alignment until he can again repeat the same process with the third prism; say the

base thus found is 36 yds. 2 ft., the width of that stream is 146 yds. 2 ft. I stated this once, and somebody, who viewed range-finders as toys which would measure 100 yds. as anything between 70 yds. and 130 yds., at once took me up; however, I asked him to place a man out in the barrack square; this he did, and I got a base of 25 yds. 2 ft. 6 in., and gave him the range as 103 yds. 1 ft. The actual chained distance turned out to be about 9 in. different. As a rule, with a definite point to take, anybody can get a distance thus with a Weldon to within a yard, with little or no trouble.

Lastly, in military sketching, the process of taking "offsetts" from a traverse line can be performed with absolute accuracy with the aid of the right-angled prism of the Weldon, and, further, a sketcher can place himself exactly in line between any two distant objects (a great assistance sometimes, as the initiated well know) by means of the same prism. If, on looking into its two facets successively the reflections of the distant objects on either side are found to cross in front of the observer, he has to advance; whereas, if they, so to speak, diverge, he must retire, until in either case he finds a spot where the objects on either side are reflected on exactly the same spot to his front, when he is, of course, exactly between them.

But, if a man engaged in topographical work expects to derive benefit from the use of a range-finder, he must adopt a pattern which he can always carry with him as he carries a watch. Further, it must be durable and capable of being used by one man alone.

I have no time to-day to enter into a discussion of the merits of various range-finders. Suffice to say I have tried almost every pattern which has been in the market for the last 12 years, and have come to the deliberate conclusion that the "fixed-angle" instruments, such as the Russian Souchier (exhibited) and Weldon, are the only reliable ones, and that the adjustable ones are practically useless, since, independently of their *bulk* and cost, the former of which renders them totally unsuited for the reconnoitring officer, they work on the faulty system of "fixed bases," thus introducing a fertile source of error.

Lastly, they cannot stand real rough usage.

This diagram shows, far better than can any words of mine convey to you, the immeasurable gulf which exists between fixed-angle instruments as advocated by me, and the mekometer, the adjustable pattern which has been chosen by our experts. Moreover, it shows how we in England appear to view an infantry range-finder from a totally different stand-point to all other nations. (How about tactics?)

This pattern of Weldon is the one I advocate for all military sketchers; it has three crystal prisms set in one above another, enabling a man to take ranges alone and unaided with a base of either

$$\frac{1}{4}, \frac{1}{25}, \frac{1}{50}, \frac{1}{100}, \text{ or } \frac{1}{200},$$

according as he feels inclined or the circumstances of the case render

most suitable. In it there is a small spirit-level—handy for many surveying operations, and, lastly, a small trough compass which enables the eight principal points of the compass to be readily ascertained by the following process (exhibited). Civilian surveyors, wiser than ourselves, recognise the value of the Weldon, and advocate it for "preliminary survey" work. I will now demonstrate to you what *can* be accomplished with the aid of a fixed-angle range-finder like the Weldon, used in conjunction with an extemporised plane-table such as I have here—in fact both instruments are here which were used in carrying out the work I am about to describe. In October last, I proceeded to the Phœnix Park, Dublin, and took the range of a small ruin on the Wicklow Hills, and also of the clock tower of the Royal Hospital; then, by the process already described, I measured the distance between the ends of the two bases, and found it to be a few inches over 224 yds., which gave the distance between the Royal Hospital and the ruin on the hill to be 11,208 yds. or so.

With the base thus measured (explained) I proceeded to make a general reconnaissance sketch of the country near Dublin, and for this purpose proceeded first to the distant ruin (which I have since ascertained is styled "The Hell-fire Club"), and from this elevated point it was easy to get shots at a number of landmarks, and to roughly indicate their nature and relative positions on the sketch here marked No. 1. Amongst these were the Royal Hospital, Lord Iveagh's Water Tower, and also Killiney Hill. A few days later I went to Killiney Hill, and, setting up my board by means of a line drawn towards the Hell-fire Club, got a series of observations, as on sketch No. 2. Lastly, I went to the top of the Water Tower, and, having set my board by the lines on the Hell-fire Club, Royal Hospital, and Killiney Hill, got a third series of intersections, shown on No. 3 sketch. Exclusive of the journeys, the actual time occupied was about half an hour on each day. I also visited the Royal Hospital, but found I could do without the rays from that point, although they were useful as affording a number of check shots. No instruments were used beyond a drawing board and a straight edge, not even a magnetic compass; subsequently I took a large piece of paper and, measuring off 11,208 yds. to scale at 3 in. to a mile, proceeded to pin the three rough field sketches (explained) at their respective points, as shown by the "setting lines," and prolong the "rays" until they intersected one another.

I should mention that two out of the three points I used were not shown on the 1-in. Ordnance map.

I sent the officer commanding the Royal Engineers in the district, Colonel Mark Bell, the transverse distance I had taken as a base-line, and by the same post wrote to Colonel Kirkwood, the Director-General of the Ordnance Survey of Ireland, and told him what I had done in the way of measuring a base-line, and asked him to send Colonel Bell the true distance, and he very kindly had it carefully verified for me at his office, and with the result that the true distance appears to be 11,278 yds., or 70 yds. more than I had taken it with the Weldon. This error of 70 yds. in nearly seven miles is about 22 in. in every 100 yds., or say 0·6 per cent.

I believe I am correct in saying that in the sketch produced the various points fixed are in no case more than 100 yds. out of their true position.

I shall now show you the rough sketch thus produced, and will only add that it does not pretend to give more than the general topographical features, very broadly treated, of about 120 square miles around Dublin. Please remember that this sketch owes its whole existence to the base-line from the Royal Hospital to the Hell-fire Club, measured with the Weldon from the range point in the Phœnix, some 2,000 yds. from the Hospital, and over 12,000 yds. from the Club. (Exhibit sketch.)

I would like here to say that if any of my audience wish to have further evidence on the subject of the superiority of range-finders of the "Weldon" type over those of the Mekometer type for the class of work I have dealt with to-day, I shall be glad to present them with a copy of a lecture given by me before the Irish Military Society last November. It is a large and a technical subject, and I have only had time to deal with the *results* obtained, and to endeavour to discuss it fully here would be to the prejudice of the main principles of topographical study which I have attempted to lay before you to-day. If, after reading this pamphlet and the subsequent discussion, in which Lord Wolseley and several other distinguished and scientific officers took a hand, anybody will kindly communicate with me and give their views and experiences of range-finders used as I therein advocate, I shall be extremely grateful.

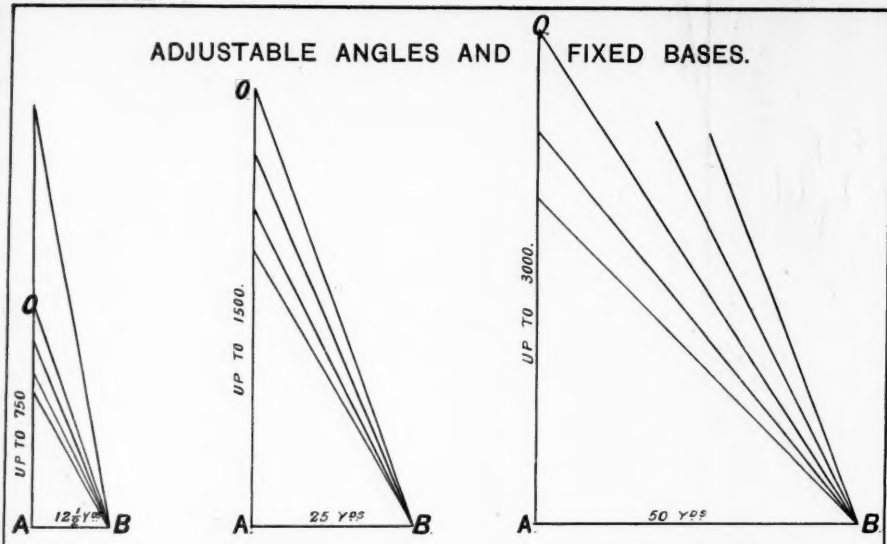
I advocate the Weldon and other fixed-angle range-finders solely because very extended experiments carried out by me, and also by Quartermaster-Sergeant Short, working with me at Shorncliffe, but independently, have caused me to distrust the other class of instruments. When a better range-finder is produced I shall equally strongly advocate it in preference to the Weldon or Souchier, which latter is certainly in a rough form at present.

I have not had time to fully exhibit and explain many of the articles exhibited here to-day for facilitating the processes of military sketching. I should mention that they comprise various classes of sketching paraphernalia, ranging from the lightest, such as a compass and a range-finder carried by an officer, to a regular plane-table equipment and portable table for mapping, &c., which would accompany the baggage. That table rolls up round the legs of the table, and is as portable as all the rest of the gear exhibited.

To conclude, I trust I have shown that this all-embracing subject of military topography intrudes itself at every step in a soldier's career. For it is impossible to draw up well-prepared plans for any military operation, either of a strategical or tactical nature, without having recourse to maps, and hence the power of readily reading and intelligently making use of a map is one of the first necessities for an officer.

Again, a good "eye for ground" is one of the greatest gifts a soldier can possess; all great leaders have possessed it, and none more so than Napoleon and Wellington, as a visit to their battle-fields will prove.

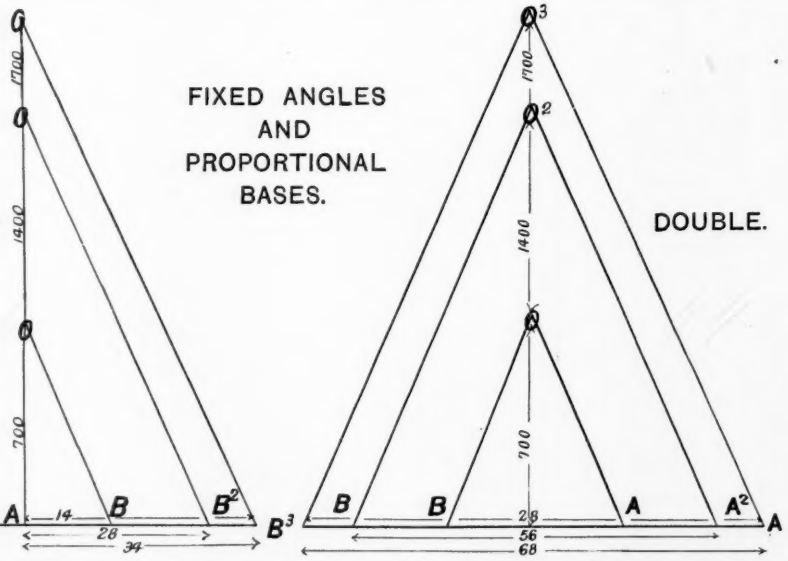
ADJUSTABLE ANGLES AND FIXED BASES.



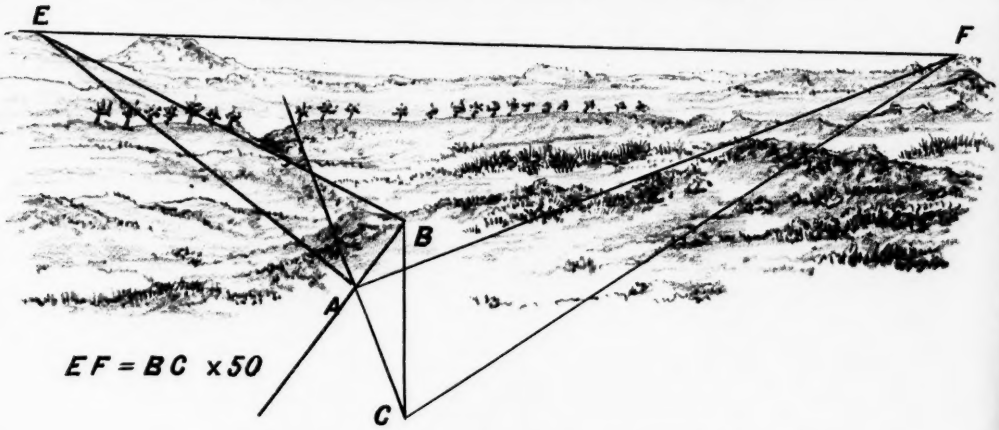
FIXED ANGLES AND PROPORTIONAL BASES.

SINGLE.

DOUBLE.



MEASUREMENT OF A BASE-LINE FOR RAPID RECONNAISSANCE OF A LARGE AREA.



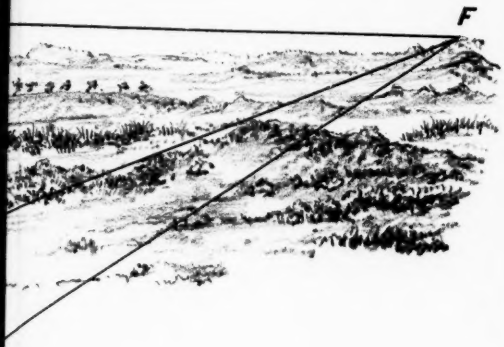
E. A. B. AND F. A. C, BOTH 90°, ADD TO EACH B. A. F. THEN E. A. F. = B. A. C., BUT A. B. IS $\frac{1}{50}$ OF A. E. AND A. C. IS $\frac{1}{50}$ OF A. F. THIRD SIDE B. C. IS $\frac{1}{50}$ OF E. F.

TRANSVERSE RANGE (DOUBLE-HANDED)

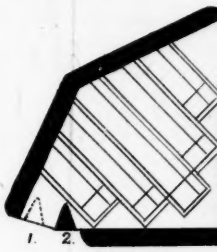
TWO OBSERVERS AT A. AND B. TAKE RANGE OF F. AND AT A. AND G. TAKE E.; THEN A. C. IS $\frac{1}{25}$ OF E. F. OR IF B. C. IS 35 YARDS FROM VILLAGE TO BRIDGE IS 875 YARDS.

Harrison & Sons, Lith., St Martins Lane, W.C.

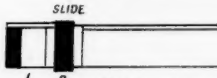
BASE-LINE FOR RAPID
OF A LARGE AREA.



TO EACH B. A. F. THEN E. A. F. = B. A. C.,
OF A. F. THIRD SIDE B. C. IS $\frac{1}{50}$ OF E. F.



Top View



Slide View

OBSERVER A
FACET ON O., H
ON A. AND O., T
YARDS.

E (DOUBLE-HANDED)

GE OF F. AND AT A. AND G. TAKE E.:
5 YARDS FROM VILLAGE TO BRIDGE

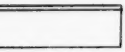
COM

RUSSIAN.	
WELDON.	I II III
AUSTRIAN.	
FRENCH.	
MEKOMETER.	

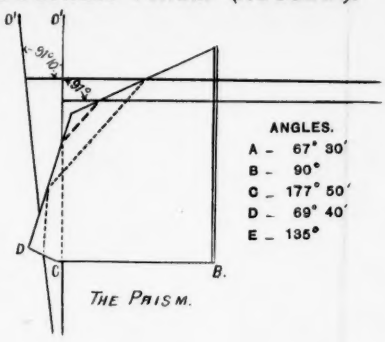
L. S. Martins Lith. N.Y.C.

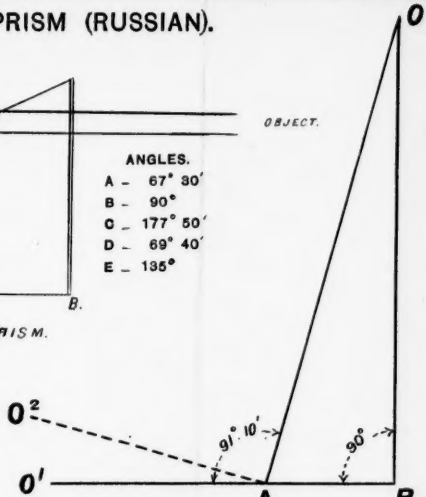
THE SOUCHIER PRISM (RUSSIAN).

p View



ide View





OBSERVER AT A. REFLECTS O. WITH No. 1, FACE ON O., AND WITH No. 2, CET ON O., HE RETIRES ALONG A. B. AND AT B. SEES O. WITH No. 2 FACET A. AND O., THEN A. B. IS $\frac{1}{50}$ OF A. O. OR IF A. B. IS 20 YARDS A. O. IS 1000 RDS.

COMPARATIVE TABLE OF RANGE-FINDERS.

	SIZE.	WEIGHT.	COST.	TYPE.
.	■	■	■	FIXED.
I	■	■	■	
II	■	■	■	
III	■	■	■	
N.	■	■	■	
H.	■	■	■	ADJUSTABLE.
TER.	■	■	■	

To rapidly reconnoitre and intelligently report is an accomplishment which may enable any officer or non-commissioned officer to give invaluable information to his superiors, but it must be rapidly done and still more rapidly reported, else it may be valueless, for here *time* is the all-important factor.

Then as to night operations: a soldier who can with confidence, and without fear of losing his road, lead a night attack on any required point, is possessed of a power which, under favourable conditions in these days of Maxim guns and magazine rifles, may do much to neutralise their deadly effect.

Lastly, in range-finding a man possesses the power of at times previously ascertaining ranges, and thus rendering the fire of his men trebly efficacious. Independently of the value of the range-finder for topographical purposes, as shown this day, the use of it for such makes a man skilled in taking distances for tactical purposes. Some here may say I have drifted into tactics, when I was called upon to deal with topography. I would say in reply that, although I have no objection to be referred to, as Lord Wolseley and other authorities have at times been good enough to refer to me, viz., as a topographical student, I would infinitely prefer to be considered a practical soldier who has taken an especial interest in all matters relating to military topography, and for this reason, that I am profoundly convinced that in an intelligent study of military topography in all its branches we have nowadays the key to all tactical successes in the future.

Lieutenant-Colonel TROTTER, R.E.: I have been particularly asked by General Chapman, who is unable to be present this afternoon, to mention, as an example of the use of the cavalry sketching case, the operations recently carried out by the expedition under Colonel Ellis in Sierra Leone, where Lieutenant Gwynne of the Royal Engineers made a route traverse of over 400 miles through very difficult country, where the narrow, twisting paths made it impossible to get long forward bearings. The work was carried out, very successfully, and closed with remarkable accuracy. I wish also to emphasize what Major Verner has stated about the necessity of verifying the position on a sketch by astronomical observations on fixed points. A military sketch of that kind can never pretend to be absolutely accurate; the circumstances under which it is made do not allow of it; but if it is carefully done, it has a relative accuracy, and if you once obtain fixed points on which to adjust it, it becomes a very valuable work. But when one comes to talk about latitudes and longitudes it is necessary to speak with a certain amount of caution, because nowadays every explorer who goes into an unsurveyed country thinks it his duty to come back with a bag full of latitudes and longitudes often obtained by means which he does not expose, and apparently revealed to him by supernatural agency. Now I think that this class of work ought to be received with very great distrust. The latitudes and longitudes so obtained may hold good until the next man goes to the same place and knocks them on the head with a fresh set, but they only throw discredit on an honest route traverse. The only safe course for anyone making astronomical observations who wishes to be trusted is to bring back an accurate account of his working, and expose them to all the criticism possible. Again, although an observer with very little practice from the mean of a few observations giving results fairly close to each other, may get a very good approximation to the full latitude, yet the longitude is altogether another question. It is very difficult for a military observer with perhaps a single chronometer to depend upon, and very few opportunities of comparing the rating, to get anything like a longitude that can be trusted; yet strangely enough, perhaps for this very reason, it is the commonest thing for travellers to be very tenacious about their longitudes. But even without

attempting to take longitudes, anyone, however little sketching he can do, may do something towards adjusting his work, by being very careful to note the points where he crosses any traveller's route, by getting good cross bearings to any conspicuous object, and also by opening and closing upon and also, if possible, passing through known points. By a little trouble of this kind very useful sketches can be made. Nowadays many officers go to shoot in Somaliland and other countries, and they can all bring back most useful work by following some simple rules. Only the other day a young officer who professed to know nothing about sketching, took the trouble to do just what was asked of him, and he came back and produced most creditable and useful work. There is another point that I have been asked by General Chapman to bring forward, that is the question of scales. According to our experience there is a constant hankering after large scale maps. Everyone thinks apparently that the more you have of a map the better. In a paper I read not very long ago, I believe by Sir Charles Wilson, it was stated that when manœuvres were first started, some commanding officers in reporting on the maps in use, considered that the 2-in. map of Aldershot was not big enough; they wanted a 6-in. map, while others asked for a map of 25 in. to the mile. It was rather unfortunate, I think, that the maps desired were not issued with the request that the officers who wanted theirs should carry and use them for a month, and report on them at the end of that time, for I am sure they would have buried them and the subject too long before the month was over. But even at the present time 6-in. maps are generally looked upon as the great stand-by, and we get constant applications for them for all sorts of purposes. The 6-in. map, however, is not a military map, and never can be. Without going into all the reasons for this, if I point out one it will be perhaps sufficient. If you take as a specimen of a theatre of operations the country south of London, and it is only a small theatre, you will find that to cover that country takes 1,320 6-in. quarter sheets and 450 full sheets, the total weight of which is 2¼ cwt. That fact alone is enough to show that for the purposes of a field army the 6-in. map is quite out of the question. This matter, however, has been very carefully considered by the Committee which sat in 1892, composed of the Quartermaster-General, the Director of Military Intelligence, and the Director-General of the Ordnance Survey. After a good deal of discussion, it was decided that the staff map of the country was to be the 1-in., and that this is the map we have now to depend upon for all military purposes. I hope, if the Treasury will assist us, we shall before very long get out the final sheets of this new military map, which is to be printed in colours. But even this 1-in. map can only be issued on service to staff officers. If you take, as an example, the same area, the country south of London, it requires 104 1-in. sheets at a weight of about 11 lbs. to cover it. The 1-in. map is, therefore, clearly too much of a good thing, for the regimental officer cannot expect to have a map on a larger scale than will cover the whole theatre of war in one sheet. In this respect we are, however, better off than other countries. I am not speaking from official sources, but entirely from memory, but I believe the German staff map is on the scale of 1/100,000, that is about 1½ miles to 1 in., the French 1/80,000, the Austrian 1/75,000, all of them smaller scales than our 1-in. Again, as we do most of our fighting in foreign countries, we should generally use very much smaller scales still. In the recent operations in Matabeleland the map used was on a scale of 25 miles to the inch, and in Sierra Leone 8 miles to the inch. We cannot expect in our colonies ever to have maps for general distribution on a much larger scale. Perhaps the largest would be 4 miles to the inch, but the more common scale would be from 8 to 25 miles. Therefore I think it is very necessary that we should try as far as possible to accustom ourselves to the use of maps which must be adopted on service, and deny ourselves the luxury of these fancy 6-in. maps, which cannot be used in war-time; and in this country, at any rate, work as much as possible with the 1-in., which is really the staff map. It is most important also that officers should be trained to sketch on geographical scales of 4 miles or more to the inch. These are the scales most important to us in foreign countries.

Colonel DOONER: I am a little nervous speaking here this evening, as we have just heard from the lecturer the great difficulty in which the officer found himself

at Woolwich when venturing to criticise anything that Major Verner had proposed. There were, however, one or two things in the lecture which I should be glad if he could perhaps make a little clearer to us. He, in the beginning, said that it was very rarely that the reconnaissance of a position would be required. I do not quite agree with that statement, because I think the cavalry screening and reconnoitring in front of an army would very often have to execute a reconnaissance of a position as well as the easy road or river, which is usually made; also in the case of an army retreating positions are, I think, usually reconnoitred, so that when the commander of the rear guard reaches them he may have a fair idea how to occupy them. I consider all officers should learn to report on a position, and I would therefore like the lecturer to tell us why he thinks the reconnaissance of a position is not just as important for all officers, and especially for cavalry officers, to learn as is the reconnaissance of a road, &c. With regard to Colonel Bell's ride in Asia Minor, we have been told that an error in longitude of only 10 miles in 800 was made. I presume the distances were calculated by riding, probably on a camel, but I cannot follow how Colonel Bell managed to work to such a successful result as that. It seems to me a wonderful calculation, and I would like to ask him how it was arrived at, how was the distance travelled each day estimated? That invention that Major Verner has shown us, the fixed ruler to the cavalry sketching board, appears to be an excellent arrangement; most of us I imagine have not seen it before. It has always been to me a difficulty, with the sketching board on your bridle hand and only a small ruler, how to manage to draw the necessary lines accurately. That pencil that has been shown us and that fixed ruler appear to me to have greatly assisted sketching on horseback, and made it far more easy and simple, because with that fixed ruler a little movement of the horse will not matter. With regard to the sketch on the wall—from Halfa to Dongola—Major Verner says it is inaccurate. I do not follow why it should be so. He said it is incorrect, because he found his camel had been going at 3¾ miles an hour instead of 4 miles as he imagined. Of course the scale may be inaccurate, but this would not affect the sketch; whatever scale that he was working with, I think the result would be the same. The only difference is, the sketch is drawn to a different scale. Then as to the table of the different range-finders, the diagram shows the approximate size and weight of our instrument, the mekometer, compared to those of other countries. It appears to me the Russians are ahead of us greatly there. The size of their range-finder is represented by that little dot, while we have a large instrument of the size shown in our army. With reference to this question of range-finding, I think, for infantry attacking, we shall seldom require ranges to be found by means of the range-finder at distances under about 800 yds. Range-finding will only be required at about 1,000 or 1,200 yds., as with the Lee-Metford rifle from 600 yds. it will be unnecessary for even a fair shot to put up the sights; at this range the highest point of the trajectory is considerably under 7 ft., and, therefore, with fixed sights and judicious aiming a man will be under fire for the whole range. It must also be remembered that in attacking, fire will seldom be opened, I think, at a greater range than 800 yds. from the position.

Major-General Sir CHARLES WILSON: I am sorry to say I have to leave almost immediately, but I should wish, before I go, to express my very warm appreciation of Major Verner's lecture. It has been most interesting and instructive, and I agree generally with what he has said. As regards instruments, the application of the range-finder to topographical work is quite new to me. It has, I think, a great future before it. I was not aware that such very accurate results could be obtained. In many countries the range-finder would be a most valuable addition to other instruments; but it will always be necessary to observe very well-defined points so as to ensure accuracy. With regard to the instruments that should be used, very good results can be obtained with all classes of instruments. On the North American Boundary Commission we worked with prismatic compass and sextant, and the sextant observations were afterwards, in many cases, verified by observations with large instruments. The distances were obtained by timing the paces of the riding horses. The work proved to be extremely accurate and good, and the sextant observations were rarely out more than 100 to 200 yds. With regard to observa-

tions for longitude, I think that, as a rule, travellers had better leave longitude alone. You cannot obtain the longitude of a place without a long series of observations with large instruments. It would be far better, in most cases, to trust to dead reckoning. In the desert of Sinai we worked with a sextant and a prismatic compass on a stand. It was necessary to use the prismatic compass in consequence of the tortuous nature of the valleys. In Asia Minor nearly all the roads were traversed by the officers attached to me during the three and a half years that I was in the country, and they were sketched in the manner described by Major Verner with a pocket compass and a book or small board. The results were very good. Major Verner carried out some experimental work for the Ordnance Survey, and I have always found his field sketches most accurate and good. His skill with the pencil is well known, and there is evidence of it on the walls. I think the improvements in the instruments that he has introduced will be very useful to field-sketchers in the future.

Lieutenant-Colonel WATKIN: As pointed out by the last speaker, we are greatly indebted to Major Verner for the topographical portion of his lecture, and there is abundance of evidence to show his great skill in the art; but I was not prepared by the heading of the lecture for an attack on the Service mekometer, which is associated with my name, so that I am not properly prepared to protect my offspring. I am not entirely responsible for the size and weight of the mekometer: the one that did best at the trials weighed, complete with its equipment, 2 lbs. 13 oz., against a modified Weldon weighing 5 lbs. 7½ oz. A mekometer could now, to fulfil the same conditions, be made much lighter than my original instrument; but it was thought better to have a larger instrument giving increased accuracy.[1] This is hardly the time or place for going into the merits of this or that range-finder, but I think we, as officers in the Service, should have some respect for the decision of the authorities given after a careful trial. To show the fairness with which the trial was conducted, perhaps I may be allowed to give a brief history of the proceedings. In May, 1888, H.R.H. the Commander-in-Chief authorised the publication of an advertisement giving details of the conditions which an infantry range-finder should fulfil. These conditions had been carefully considered by the authorities, including the School of Musketry at Hythe. It was originally intended that these trials should be conducted by the Ordnance Committee, who had had a large experience in these matters, but when it was discovered that I was one of the competitors, the Adjutant-General (Lord Wolseley) decided to have an independent Committee of infantry officers. Now the composition of that Committee will show that, at all events, there was no bias towards myself, as the School of Musketry was represented by one of their staff, and, moreover, two staff-serjeants from Hythe worked the Weldon range-finder. Troops of all arms were taken out, and the inventors, at a given signal, told to take the ranges—one minute being allowed. These ranges, of necessity, could not be known till after the day's trial was over, when they were carefully measured. The result of these trials was not only that my instrument was recommended, but that there were several others which were adjudged better than the Weldon. The lecturer says the adjustable range-finder type cannot be used for obtaining the distance between two inaccessible points. Surely such an instrument can be placed to any angle you please; and all that the lecturer has shown can be done with the Weldon can be done with greater rapidity with the mekometer. That officers are working in this way is shown from a letter I have received this month from India: "Your instruments are none the worse for a year's wear; the mekometer is capital for sketching, &c." Sir George Colley in Zululand was the first to practically use range-finders for field sketching; his opinion was that their use would revolutionize military surveying, and I am glad to learn from the lecturer how fully he endorses that opinion.

Captain MALONEY: Should not military topography, to be quite up to date, include some method of reproducing maps, so that several copies may be sent

[1] In the diagram shown on the wall the instruments, not the complete equipment, are contrasted, a very different matter. The weights given are those quoted by the Committee.

in, instead of one only? If the General receives only one map, no matter how useful it may be to him in forming his plans, he may still be at a loss in communicating his plans to his subordinates; whereas if he has several copies, he can mark on the plans the positions he wishes his subordinates to take up, or the lines of march, and all chances of misunderstanding will be reduced to a minimum. Besides, in any subsequent operations that may occur, it is important that the subordinates should have plans corresponding to his own, otherwise he may order them to occupy a village or a wood or a farm which is not named or marked on their maps. In the days when reconnaissance was chiefly used for record purposes, one copy might suffice; but if this new system comes in—the system of using the range-finder and the plane table for mapping country far ahead from a few commanding points—surely we shall all want copies of the very valuable plans that have been produced in that way. Then again, just as the range-finder assists topographical work, so the topographical work assists range-finding; that is to say, if you want to know the range of an enemy, it would be a most useful thing to have a good map in your hand from which you could measure off the range on the scale. But for a reconnaissance to be of any use for this purpose, you must have many copies. This copying will be said to take too long; but a great deal can be done with the common hectograph. I have used it myself on active service at Suakim with fair results, while the "black autocopyist" gives excellent results, and I believe their use would only involve a delay of, perhaps, half an hour in sending in the first copy, and after that you might send in 20 or 30 copies an hour. Seeing that men cannot be expected to do in war-time what they have not practised in peace, I submit that a little instruction in some copying process ought to form part of the course of topography, especially for N.C.O's.

Colonel E. GUNTER: I have listened with the greatest interest to the lecturer, and much appreciate, as I feel sure all officers present will, the ability with which he has treated the subject. I should like to ask him if he has tried the "Bate" Range-finder. I have not had very great experience, but, when I used the "Weldon," I found it gave very good results, and was far superior, of course, in portability to any other.

Colonel FEATHERSTONHAUGH: I think Sir Charles Wilson took rather an extreme view about longitude. I was at one time on an exploring expedition where it was necessary to explore 50 or 100 miles ahead. The officer who did that duty was in the habit of carrying two or more watch chronometers and a sextant, and his longitude work was done very accurately. Now a watch chronometer is not much bigger than an ordinary watch; it is very easily carried. From a military point of view, therefore, if checks are required for exploring service, astronomy can be used; only officers ought to be trained to do it, because it is not easy to pick up.

Lieutenant-Colonel GOLDSMID: With reference to this very interesting lecture, there is one point that I should like to ask Major Verner, namely, whether any improvement has been made in the last three or four years in the system of obtaining topographical information by signalling or electricity. There is a means that I was instrumental in bringing out when at the War Office, by which we could telegraph or signal information by the use of co-ordinates. A Liverpool volunteer, if I remember rightly, suggested an ingenious system of combinations of three letters, applying the same to co-ordinates, by which means the maximum number of permutations in a given space could be secured. In the War Office we had it embodied in an Army Form on drawing-paper, and the horizontal and vertical co-ordinates being ruled very closely together, practically any point on the paper could be identified by the three letters representing the intersection of the nearest co-ordinates. This enabled an original sketch made on the paper to be transmitted, by signalling or by telegraph, with great rapidity, but the difficulty was how to apply it for correcting or adding information to existing sketches or maps. You can understand how very important it would be in the case of a Boundary Commission. For instance, say in Afghanistan a dispute arose between the English and Russian Commissioners, and each party had to telegraph to its respective Government for instructions. To describe by telegraph the points in dispute connected with proposed new boundaries would result in having to send cablegrams of inordinate

length at enormous expense. It occurred to me if we printed the army form alluded to on tracing linen we should be able to telegraph alterations and additions to existing maps and sketches with great ease and rapidity, and at an enormous saving of expense. This was done, and now all that is necessary is for the sender and receiver to fix the form on the tracing linen in the same position over their maps, after which each spot on the map would be identified by three letters. Thus instead of having to cable "a point one mile and three-quarters S.S.E. of Penjdeh," the letters "T F m" would suffice. I should like to know if there has been any improvement in that system, and if Major Verner has tried it.

Colonel BOYLE: I hope I am wrong in thinking that Major Verner, so eminent an authority as he is on military topography, being quite a master of the art, holds cheap an old friend of mine with whom I have been associated for a great many years, who has always been of great use to me. That old friend is the prismatic compass. I maintain that the prismatic compass is an instrument the value of which should never be overlooked. I had great experience of it in Canada, and afterwards in South Africa, and in both cases it did everything I wanted well. In Canada I was out four months surveying the country between Prescott and Kingston on the St. Lawrence, and I think the valuable qualities of that instrument ought not to be overlooked in teaching young officers coming on to join the army of the present day.

Major VERNER: In reply to some of the remarks that have been made, it gave me very great pleasure to hear from Colonel Trotter that my own pattern cavalry sketching case which, since I worked it out, has only been used by myself in peace-time, has been found to be so useful in a wild country under "Service conditions." I quite agree with Colonel Trotter about the danger of depending on sextant work in the hands of inexperienced people. With regard to the scale he advocates for manœuvring maps, I had the honour of being examined by the Horse Guards Committee on that subject, and I then gave my opinion, as Colonel Trotter knows, that I thought the 1-in. map was the one that was desirable. Then again about scales; Colonel Trotter advocated we should sketch at 4 miles to an inch. I would only say that if that Dublin "range-finding" map was done on the small scale of 4 miles to an inch, instead of three inches to a mile, the errors would be so small that they would be inappreciable. Colonel Dooner asked why I said we should not sketch positions? My answer is because I am strongly of opinion that the British Army want their cavalry to go out and find the enemy, and report, and, if necessary, fight him; but it is *not* wanted to go out and draw pictures of every position which might possibly be suitable to fight a battle on some day. I do not believe in it. I know I am in the minority here, but I do not believe that our cavalry should go out and try and sketch the whole country. A General might say, "I want a position covering so-and-so reconnoitred and mapped out"; but in such a case you would always find that an officer with a talent for sketching would be picked out to go and do the job, and you cannot hope to make every officer go and sketch a position, which is a very technical operation. Sir Charles Wilson talked about the necessity of defined points for range-finding. That is no doubt very right, for without defined points you cannot use any R.F., but in that particular case in that valley (indicated) which represents, as a matter of fact, the valley of Abu Klea, there were defined points, because there were clusters of the enemy on the heights, on either flank, which would have given capital points to range on. In rapid reconnaissance work, I have found it a good plan (particularly with lancers) to send a man to gallop up and mark a point on a hill, which can subsequently be identified and used as a plane-table station. When Sir Charles Wilson described how good work was done with prismatic compass, it must be remembered that he said he used it on a stand. That is just one of the points. It is a vastly different thing carrying out work with a compass mounted on a stand, and, as many of us have done, holding it up to the eye, when the thing goes round like a firework, and, very often, it won't come to rest for a long time. Colonel Watkin made several statements which I must absolutely traverse. No doubt he made them not quite realising one or two points, which time did not admit of my discussing more fully. He talked of the Weldon weighing several pounds, over five, I think he said. The Weldon, as advo-

cated by Colonel Weldon, weighs between an ounce and three ounces. Colonel Weldon is here, and will say whether that is right.

Colonel WELDON: That is quite right.

Major VERNER: Of course, it is impossible to enter into this big subject to-day, but if Colonel Watkin will do me the honour of accepting a copy of that lecture of mine, he will see that I have gone into the whole question of his own as well as all other R.F.'s most carefully. I never asserted that if his was ruled out Colonel Weldon's would be second; what I asserted, and still assert, is that I have tried them all, and look upon Colonel Weldon's as the most practical for topographical purposes and use in reconnoitring. The Russian "Souchier" is also useful for such purposes, and equally durable. I do not follow him quite in what he says about the distances of traversing objects, and so on; I talked about the *transverse* distance between two distant objects, not about "traversing." Of course I am aware you can screw down one of those adjustable instruments, and so work it as a fixed angle R.F. at a pinch; but my point is we must have a light and portable and durable instrument. Thus, for example, we could not have had a mekometer weighing 6 lbs. with us the night before Abu Klea, when Colonel Dickson and I reconnoitred the enemy's position; whereas we *could* have had that small Weldon in the pocket; that is just the difference. If you could mobilize the mekometer and march him up to the front, no doubt you could do admirable work with him, provided he was in adjustment. I took the range of base-line with the mekometer within a yard, as I described in my lecture, and I do not think that is a bad record for the mekometer; but it is not suited for the class of work I advocate. I disbelieve utterly in the value of taking moving objects. I have taken them for years. Quartermaster-sergeant Short and I, in our leisure moments, used to amuse ourselves at Shorncliffe by taking the trains as they ran past, and we have even taken the Brussels express! That sounds a big order, but it only runs through there at about 40 miles an hour; and if you can get at about the right distance apart you can always move at 2 miles an hour, which is all that you want to do to obtain the coincidence for a train moving 25 times as fast. As against the letter from India which Colonel Watkin has quoted, saying that they had found the mekometer admirable, I also got one last week from a commanding officer in India, in which he said: "I have used the mekometer for a year. I found the cords so troublesome that I have now given it up, and gone back to my old friend the Weldon." Captain Maloney talked about reproducing maps. I quite agree with him; but it is impossible to deal with all these technical points. Of course maps must be copied. In reply to Major Gunter, I have, of course, tried the "Bate's" R.F.; it is attached to a field-glass, and that is no doubt a very great advantage; but it comes under the adjustable type, and so I do not think it is good for our work. As regards the application of electricity and signalling to surveying, it, no doubt, is an admirable suggestion, but it is of more use for technical surveying than for reconnaissance work; all the same, it is an excellent adjunct for topography. Colonel Boyle alluded to his old friend the prismatic compass. Now, when I first saw Lord Wolseley about this compass question, he used the same words, and said: "The prismatic compass has been a very old friend, and I have found it a very useful servant." As we all know, Lord Wolseley when a young staff officer did admirable work in the Crimea, and in the Mutiny, and in Burmah before that, and he told me he always used the prismatic compass in those campaigns. When, however, I worked out this pattern magnetic compass, and had the honour of showing him how I used it, he ordered the first that was made, and has always advocated it since. He may have found the prismatic compass to be a useful servant, but how many British officers have not found it to be a most disagreeable master? That is the point. I am delighted to hear Colonel Boyle made such a good sketch in South Africa; but another officer who went to South Africa was not so fortunate, for, when he came back, he said "The place was so full of ironstone he could not use it at all."

H.R.H. THE DUKE OF CONNAUGHT AND STRATHEARN: Gentlemen, it is already very late, therefore I have no intention of taking up your time by any long remarks. I only hope I shall be expressing the feelings of everybody here present when I say we have all felt great interest in the subject of this day's lecture, and

are very much indebted to Major Verner for the most excellent manner in which he delivered it. We have heard from the discussion that has followed the lecture that there are a great many different opinions on some of the statements made by Major Verner. I am not going to enter into those differences of opinion, but I must say I think Major Verner has spoken very much what is the opinion and feeling of many practical officers of the army. I think he has recognised the importance of having handy and useful instruments, that can easily be carried in any officer's pocket. We know that the larger the instrument, in many ways the more accurate the result; but it is not a question of the most accurate instrument, as I understand it, it is a question of the most practical instrument that will be sufficiently accurate for military purposes. There is only one other thing I would point out, in which I most strongly agree with Major Verner, and that is that every officer or non-commissioned officer is not gifted, has not the talent to make sketches. What you first want is for them to be able to read a map, and I am certain that what we in the Service should devote our great attention to is to make every officer and every non-commissioned officer thoroughly *au fait* with a map immediately you put it in his hand. Another thing which Major Verner also alludes to is the great necessity for inculcating observations from the moment a man enters the Service. I am sure, given the ready knowledge of reading a map as soon as it is placed in your hand, and given the observation—I mean by "observation" observing as you go through a country, wherever you are—observing the different points that would be of use to you to report on to your superiors—I say, given these two things, I am certain, with staff officers who show that intelligence and that perseverance that Major Verner has done, we shall arrive at having the necessary and the simple instrument that will be the most useful for the ordinary regimental officers of our cavalry and infantry regiments.

FIG.1.
COMMAND.

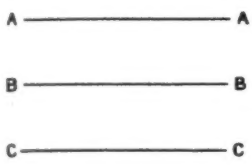


FIG.2.
COMMAND.

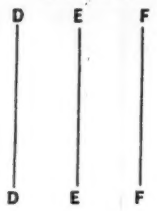


FIG.3.
COMMAND.

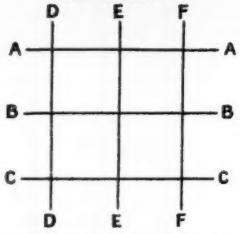


FIG.4.
COMMAND.

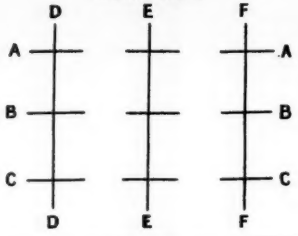


FIG.8.
BATTALION.
400Yards

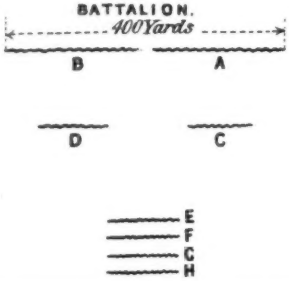


FIG.9.
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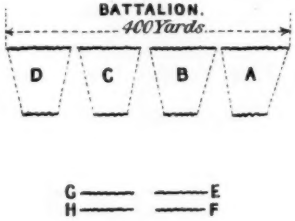

FIG.10.
BATTALION.
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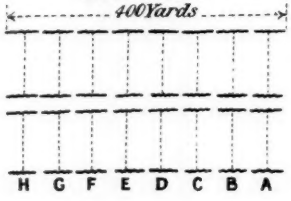


FIG.14.
BRIGADE.
400Yards

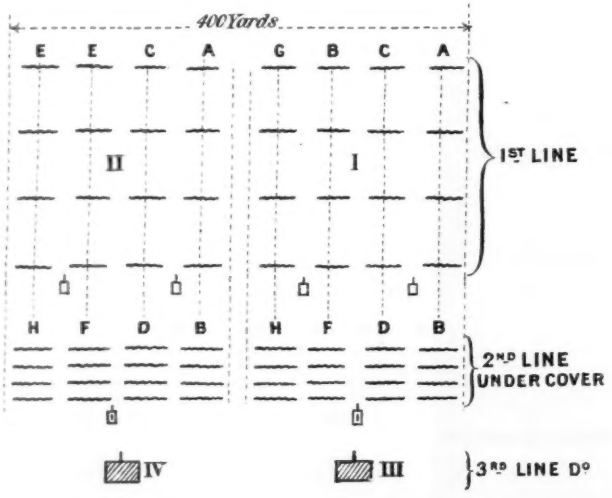
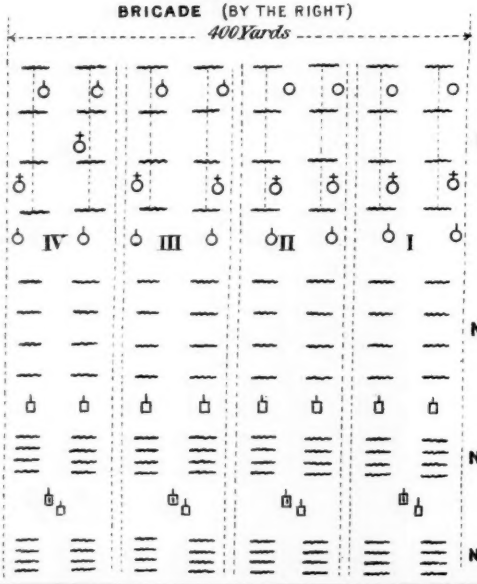


FIG.15.
BRICADE (BY THE RIGHT)
400Yards



HARRISON & SONS. LITH. ST. MARTINS LANE. W.C.

FIG. 5.
BRIGADE.

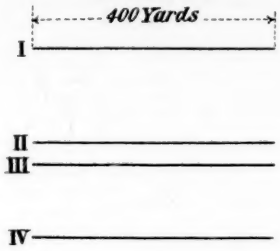


FIG. 6.
BRIGADE.

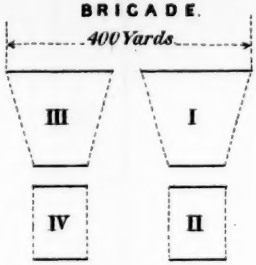


FIG. 7.
BRIGADE.

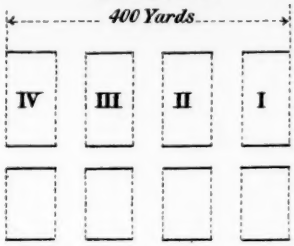
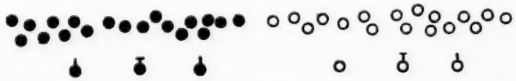


FIG. 11.
TWO COMPANIES.

Firing Line reinforced.

FIG. 12.
TWO COMPANIES.

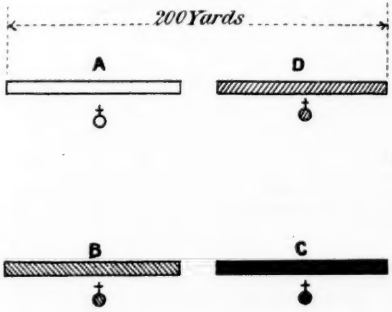


Firing Line reinforced by a Section Column System.

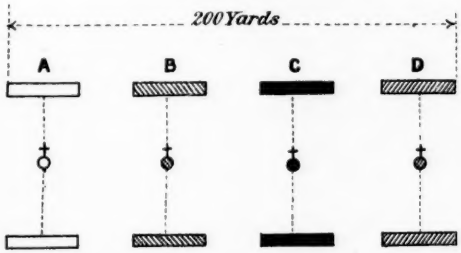
A. B. C. D. *(mingled)*

Kept distinct to the last

PRESENT METHOD.



PROPOSED METHOD.



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THE FIRING LINE AND HOW TO KEEP IT ORGANICALLY SUBDIVIDED TO THE LAST.

By Lieutenant-Colonel H. A. Sawyer, Commandant 45th (Rattray's) Sikhs.

In battle victory is only to be obtained by means of a good firing line, actual or potential. Good as regards numerical quantity, moral quality, and technical efficiency, but, above all, good as regards its system of supervision; for then only can its existence under destructive conditions be maintained. And as the constant replacement of casualties in the firing line is dependent on the methods employed for feeding it, the consideration of its construction will necessarily include the consideration of the disposition of all the troops on the battlefield. How to sustain the firing line to the last moment without extinction of its organic vitality is a question of continued interest, especially so in an army like ours, which can ordinarily have but a small battle front with but a small replenishing power.

Other armies have seemingly solved the problem each in their own way. It is essentially one in which national characteristics play an important part. In some countries quantity is large, quality inferior, technical efficiency low. In others the changes ring differently. That quantity is invariably small with us compared to others must be undisputed. Opinion may differ as to the other two qualifications. We should, however, not be afraid of making comparisons; and draw our conclusions, boldly making use of those differences which are to our advantage.

For instance, assuming quality to be the same both as regards officers and men, then, for the same quantity, that army which has the greater proportion of officers to men must be held to be the more efficient. Such an advantage will be greatly increased if, money being no consideration, good mechanical skill permits of superior weapons being placed in the men's hands. We should be able to claim both these points for our army without comparisons being considered odious. How best to utilize these advantages will be referred to later on, when dealing with the definite proposal of this paper.

We have a special difficulty to contend with when trying to solve the firing line problem. It is due to our organic units being smaller compared to similar units elsewhere, and that those differences, small and great, which separate corps in feeling, in system of training, &c., are more sharply defined. Yet the difficulties are none too great but that they can be taken into consideration by any one of whatever grade interested in these matters. The interest, however, must be of a genuine kind. It must be born of the difficulties met and the experiences gained whilst actually in command of company, battalion, or brigade. Those who have never had this experience (a few years

of field days under different kinds of commanders would be sufficient) are not qualified to speak as witnesses in matters of detail such as we are now considering. As to this we cannot be too emphatic, for much mischief is done by the writings and talkings of those who, though in the profession of arms, have had little or no contact with its basic elements, viz., companies and fire units.

On the other hand, no attempt will be made to go counter to all and any of the principles laid down by superior authority for the guidance of the army in the recent drill books. Whether concurred in or not in their entirety, they are accepted as binding, and also as the boundaries within which the following matter lies for discussion. This also needs emphasis, as more or less strong views are held by many as to the merits of some of these guiding principles. To hope for a universal concurrence of opinion in military matters, however, is of course useless. Yet the adoption of certain principles binding on all is such a necessity for the attainment of harmonious combination of arms and individuals, that it is my desire to omit every aspect of the question which cannot be fairly said to have a position within the rules and guiding principles of the regulations.

Let us be quite clear, however, as to what these are. We shall find not a few changes when contrasting them with former ones.

In Part V of the Infantry Drill Book, 1893, we find among the general rules for "Distribution and duties of the three Lines," the important guiding principle (p. 114) that the division of troops allotted for the attack will, when in sufficient strength (and let us hope that we may never have to commence an attack unless in sufficient strength), be in "three lines." At first sight, and ordinarily, this will be read to constitute three separate lateral commands (Fig. 1, AA, BB, CC).

But the important ruling at para. 111, 3, where the importance of "depth" command is dwelt upon, must be read as a prominent rider. This "depth" may be illustrated by Fig. 2, where DD, EE, FF indicate the direction of the depth commands.

If both commands were of equal weight we would have their directions as in Fig. 3, one clearly antagonistic to the other. In practice one would have to give way. Which? The stratiform commands (Fig. 1) are obviously artificial, and therefore transient. The "depth" commands (Fig. 2) are organic, and therefore permanent. Occasion may arise when this qualification is reversed, by having, for instance, an entire battalion in the first and another in the second line. But such a distribution, as we shall see, is opposed to an important guiding principle of the Drill Book (para. 111, 3, and 126, 7), and, though permissible, should be the outcome of accident rather than of premeditation.

The artificial distinctions of stratified commands are short-lived. In no case would they outlive the assault stage, for if the position is taken in good fight, the two first lines would, long before this stage is reached, have merged into one (para. 111, 2; 124, 5). The third line command might form the nucleus for a fresh command composed

of *all* available troops (116), sent in pursuit, or required to cover retreat, but its original entirety may also be said to cease with the passage of the critical moment, whether favourable or adverse.

The idea of stratified commands dates from ancient days. They were frequently distinct lines of battle with separate and distinct functions and objectives. If the first line of battle failed, it frequently opened out and removing to the flanks, permitted a fresh engagement to commence with fresh troops, under a fresh command. There was an entire absence of the idea, so essential nowadays, of the individuals of one line feeding the line in front.

Owing to this compulsory change, however, distinctive stratified commands can hardly be conceived on a modern battlefield. And, in every case, in future it will be seen that it is necessary to have "depth" greater even than that already contained in the support and reserves of the first line. The functions and objectives of the second and successive line being now necessarily precisely those of the first line.

Merely as a means for keeping order by segregation in the first stage, strata of troops and commands may be required. Occasionally they would make it easier to supply the troops with which the manœuvres described at p. 115 have to be carried out, whereby "the line can be reinforced by men drawn from other and less important parts of the field." As a rule, however, it must be accepted that the nearer the troops approach to the enemy's position the less important do lateral commands become, and that sooner or later they die a natural death, due to extinction by absorption or by interlacing of units.

The Drill Books see no necessity for defining the limit of such lateral commands. The last time our troops were formed in battle array the second line command was a mile and a half in length. It can hardly be conceived that they should exceed the frontage of that taken up by a brigade. Nor does the book contain any principle indicating that they could not be reduced to very small limits, say, the extent of a company front. In such a case the length of the "lines" would of necessity be a multitude of small commands, as illustrated by Fig. 4, where DD, EE, FF set forth the direction of the depth commands, and AA, BB, CC broken stratified commands, the two latter now, instead of being "second and third *lines* of battle," are small bodies of troops *in* "second (or third) line."

This important distinction is clearly in accord with the ruling, where the "depth" principle is held applicable "to the smallest fractions of a force in the same degree as to the largest" (111).

This distinction is, moreover, curiously enough brought out in the Drill Book in another way. If we turn to page 114, we read of three "lines," a word reproduced in successive Drill Books, from the days of their infancy. Turning to page 97, which is of modern origin, we read of three "bodies." Whether the change is intentional or not, it is an indication that the word "lines" is admitted as giving cover to an exploded conception. The explosion is, however, not sufficiently universal. For instance, it is commonly held

and taught, that the function of the first line is to "prepare" the attack, and the duty of the second is to assault. This used to be so. But nowhere does the new Drill Book even hint at such a fettering principle; on the contrary, in Art. 115 (2) it is clearly implied that the assault will be initiated by the firing line. Another common idea is that the duty of the line in rear is to protect the flank of the line in front. This is flatly contraverted by the Drill Book, at p. 128, where it rules that "flank attacks will be met by the troops upon whom the attack falls."

The primary duty of the troops in the second line is to support the *development* of the attack commenced by the first line (111, 2).

In a battle worthy the name, the first line and the firing line will become synonymous terms soon after entering the medium ranges. Before entering the decisive ranges, this now single line will require reinforcing. It is the first duty of the second line to do so. The Drill Book rules that in front of "the portion of the enemy's position selected for assault" it will be "*several lines deep*" and "close up to it" for this purpose.

Nor is there any trace in the Drill Book of the second line "passing through" the first line. Such an antique piece of manœuvre would be preposterous under present magazine fire, unless, indeed, the first line were all laid low, when "passing over" would be the better term to apply.

In all cases of a strong defence, then, we find that the duties of a properly employed second line, according to the Drill Book, will be no more than those appertaining to "reserves," at the outset placed for convenience of control sufficiently distant from the reserves in the first line as to require temporarily a separate command, especially when in accordance with the rules (117) they are of greater strength than the first line.

The same may be said of the third line. Its first duty is to confirm success. This can only be done by, when necessary, keeping the firing line at full strength, or by closing up with the lines in front. In either case they would play the same *rôle* as reserves.

We conclude this point by saying, then, that what are termed in some portions of the Drill Book second and third lines are no more than "reserves *in* second (or third) line," and may therefore be better called "second (or third) reserves," with precisely the same functions and duties as the first reserves in the firing line; and that the idea that the second and third "lines" are independent commands, with distinct duties from those of the first line, must be entirely removed from our minds.

As to frontage, the guiding principle is that "the frontage allotted to an attacking force should *not exceed* that which the troop composing the first line would cover were they deployed two deep" (p. 117).

For an entire battalion (800 strong) the frontage ruled by the Drill Book would thus be 405 yds. This is the maximum. The minimum not being stated, it is to be inferred that it will depend on the work to be done, and the ideas of the officer in command.

As large a general front as possible will, of course, be striven for, so as to comply with the demand for the largest fire effect from the outset, but this fire effect may of course be obtained by several units in the general frontage.

The frontage of a battalion depends entirely on the dispositions of the brigade. "The C.O. will be informed by the brigadier as to the *extent* of the frontage the battalion is to occupy" (p. 126). The frontages of a brigade or of a division, and of an army corps, are specified (p. 128), but that for a battalion may range from a company front (50 yds.) to a battalion front (400 yds.), a wide margin, at the *brigadier's* disposal for allotment.

The brigade battle front lies between the two extreme measurements of 400 yds. and 800 yds. (p. 128).

Let us briefly glance at some of the dispositions the brigadier is authorised to force on a Commanding Officer of a battalion.

With a minimum of 400 yds. in view, he may distribute on the principle of Fig. 1, and place one entire battalion in the first line, two entire in the second, and one entire in the third line (Fig. 5). Or he may so divide the brigade frontage as to give two C.O.'s half each (Fig. 6). Or, if he fancies the principle illustrated by Figs. 2 and 3, he could even allot to each battalion a frontage of only a fourth of the minimum (or maximum) brigade front, as in Fig. 7. All these methods are within the authority of the Drill Book.

The brigadier having selected and made the allotment, it is the turn of the battalion C.O. to allot the companies to take up this given frontage.

There are several ways of taking up a battalion front. A common method is shown in Fig. 8. Another method is four companies side by side, half each in the firing line, half in support (Fig. 9). This is in accordance with the ruling at p. 126, where it says that a company should not have more than two sections extended, the remainder being retained in support. Further subdivision could be made by placing eight companies in the firing line, as in Fig. 10.

Between these two extremes (Figs. 8 and 10) there are of course several other ways, but any such would have all or some of the defects and merits of the extreme cases. To enable a C.O. rapidly to decide which of these many methods would best suit the circumstances of the moment, it is necessary that he be fully aware of their respective advantages and disadvantages.

Let us examine Fig. 8. This used to be a very common formation, and one to which some of the older members of the profession might naturally cling; but for present and future use it is a hopelessly bad one. The extended front of 200 yds. to a company is so large that, except on a battle-field like a billiard-table, supervision by officers and N.C O.'s would be quite impracticable. A slight undulation, a hedge, mist, rain, or wind, to say nothing of noise, makes this command an impossibility.

The greatest drawback of all, however, is that reinforcements, which with such an extended front would be required early, are at once made from another company. Thus from the very commence-

ment, and before entering medium distances, the firing line would have its original organization broken into. This is fatal to good fire effect, and it is well that the Drill Book prohibits indirectly the continuance of such a distribution. There exist certain proposals for meeting this disadvantage. One such is the "Pell Mell" line. This (like the others) resolves itself into merely *accepting* a bad situation and trying to make the best of it. Our endeavours should, I think, first be directed towards *preventing* the bad situation. Prevention is better than cure in all matters of life and death.

We have seen that in a battle worthy of the name it is to be expected that all, or at least portions, of a second line (or of troops *in* second line) will have been absorbed in the firing line by the time the decisive ranges are entered. This of course infers losses of perhaps 60 per cent. of the original first line, by no means an abnormal estimate for an attack on an enemy in position, whether assaulted in front or on a flank.

The last time we fought a battle by daylight General Pennefather's brigade lost one quarter of its strength before getting into the attacking stage on the "Redoubt" slopes. True it was in line two deep, but then the Russian round shot and shell was child's play in its effect when compared with the shrapnel or long range magazine of the present day. Let us assume that such an attack is taking place, and that at 800 yds. the supports and reserves have all been called up into the firing line. Now look at the diagram on the wall (an enlarged Fig. 11). To clearly demonstrate my meaning each company is given a different colour, and if the original disposition was that illustrated in Fig. 8, the diagram (Fig. 11) represents the state of the firing line at 800 yds.

On a front of 200 yds. we find mingled the mangled remains of four companies with four company commanders, 32 fire unit commanders (original or renewed), all still in possession of recognised functions, and all striving with voice and gesture to carry out their duties. The result can be left to the imagination. In Fig. 9, the best formation specifically mentioned in the Drill Book, we find three companies so mixed before the troops in second line have been called upon to reinforce. When that happens the firing line would be composed of portions of four or five companies belonging to two different battalions. Now let us contrast this confusion with the results obtained by placing the companies as in Fig. 10. Here we have the same total frontage, subdivided in an orderly manner, and grouped as in Fig. 12 (enlarged on the wall).

On an easily managed frontage of 50 yds. the entire company is kept together. Eight sub-sections, one after another, take up this front, which never has more than one commander and two fire unit commanders, however mangled the entire firing line, of battalion, or of brigade, would be composed of unmingled organic units.

This 50 yds. is the natural frontage for a company (100 strong). It is the limit practically prescribed by the Drill Book at p. 123 (4). For if greater than this the men in the firing line would have more than

one yard interval, and this would be contrary to the fixed rule as to the strength of the firing line, which is to be as dense as possible, consistent with the "free use of arms."

Now carrying this kind of distribution still further, which I repeat is strictly in accordance with the principles of the Drill Book (111, 3), it is within our reach to obtain a firing line, even at the decisive ranges, reinforced by the entire "second line," without having any admixture of regiments at all; and no mingling of more than two, or at the utmost three, companies of the same battalion. For instance, on a brigade frontage of 400 yds., two battalions placed side by side, with each four companies in the first line, and the other four in second line, would prevent any admixture till the third line came into play. See Fig. 14. Going a step further (Fig. 15), we could have all four battalions in a brigade sharing the honour and glory and casualties of the engagement; and, however hard the fight, if even up to the absorption of the entire second and third and fourth lines, the regiments would be kept apart, unmingled, with the best chances for "vying with one another," and giving the fullest scope to their own systems of training and *esprit de corps*. The units would remain organically distinct to the last.

No doubt these diagrams, setting forth what may be termed the most approved distributions, as permitted by the Drill Book, have an unfamiliar look.

The absence of "fan-like" dispositions and "échelons" of supports and reserves is conspicuous. The appearance is that of dreaded columns. But will échelons and closed bodies in support be at all practicable in future? Let us see. Take Fig. 8 as the hitherto orthodox distribution of eight companies. Here we have two companies in the first line—two in support and four in reserve. The absolute impossibility of a good company command of 200 yds. has been already referred to, but we are now concerned with formations and relative positions of the supports and reserves.

As to their formations, the Drill Book rules as follows: "Supports usually move in line, in single rank if necessary. Reserves in line or shallow columns" (116). "Shallow formations must be adopted *before* coming under fire" (116). They must be not further back than 400 yds., but "these distances must be greatly diminished *at any risk* as soon as the firing line begins to suffer serious loss" (118).

As the firing line may begin to suffer loss at 2,000 and assuredly will seriously at 1,000 yds., the ruling must be read in the most modern spirit, so that supports in line and reserves in shallow columns will have to be restricted to distances *beyond* the first zone, that is, should the defenders be armed with weapons equal to our magazine rifle and the 12-lb. field gun, about 2,500 to 3,500 yds. from the position attacked.

The rule for distance apart of lines is found at pp. 117 and 118, "Successive lines, if under artillery fire, should avoid formations in which any two offer a target to the same projectile." "During the

earlier stage of the attack the second line may be about half a mile from the first."

At medium and decisive ranges the second line must be well up, and as foreshadowed above, the troops of this line will be continuing the work of the already absorbed supports and reserves; it will of necessity be closer up to the firing line than the *extreme* distance for supports and reserves, viz., under 400 yds.

The length of the 12-pr. shrapnel beaten zone is 500 yds. at 1,800 yds., perhaps 600 yds. at 1,000 yds. Thus at the outset, and except from the very earliest stages, the distances indicated in the Drill Book will not in future be a safeguard as heretofore for preventing "successive lines offering a target to the same projectile." But the distances cannot be increased without leaving the firing line unsupported, so that other means must be resorted to, to diminish the amount of loss which has to be incurred at "any risk."

The high remaining velocity of the 12-pr. gives this great length of zone, but this same velocity also narrows it. The maximum effect at 1,000 yds. would be obtained by a burst 100 yds. short, 7 ft. above the level of the target. The cone then obtained covers at its axis a front of 20 yds., with an area of 70 sq. yds. to each of the 141 effective bullets striking (Fig. 16).[1] The number of sq. ft. for each bullet in a vertical target for the above shot is 16. If the target be $6\frac{1}{2}$ ft. high, we would have one effective bullet for every yard of front. So that supports "in line" would for each such shot drop 40 men. Reserves in "shallow columns" would lose at least 80 men. Where the preservation of numbers is of less moment than with us, the advantages to be gained by keeping to line and shallow columns formations may be bought at the above price, but hardly otherwise.

The infantry fire is perhaps as deadly with the magazine even at long distances (1,200 yds.). When our rifles have been brought up to date a sudden well-directed magazine squirt by a section or two would flatten out a closed support or reserve in a minute. It is this power of a sudden "mowing" effect which is the chief improvement of the new rifles—mowing is best when the crops are close.

One of the many prevailing ideas accepted without meditation is that an advance on a position can only be commenced by the infantry after the defender's power to fire has been broken, or at least shaken, chiefly by artillery. This idea requires serious reconsideration. The chief characteristic improvement in modern arms is, I take it, their "mowing" power. This is best produced at decisive ranges. Therefore, a properly conducted defence would be that which retains its *fullest* fire effect, guns and magazine, for these distances. This result, if desired, can only be obtained by keeping the lie of the shooting line secret as long as possible, and this naturally requires the defenders to abstain from firing at long ranges from positions in the shooting line until the advance of the attackers' infantry masks their guns. From selected and other positions, gun, Maxim, and magazine rifle fire may, even at longer ranges, frequently inculcate

[1] Figures taken from Major Baker's Preliminary Tactics.

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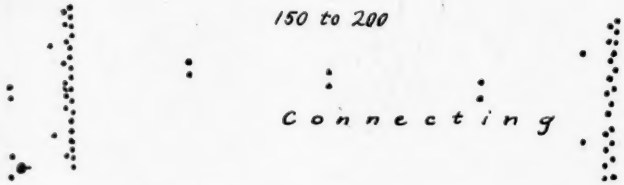
[1] Figures taken from Major Baker's Preliminary Tactics.

Fig. 17.



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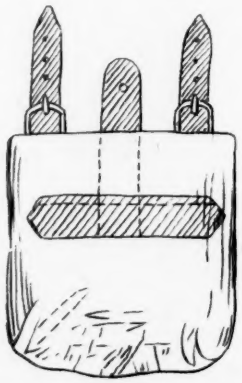


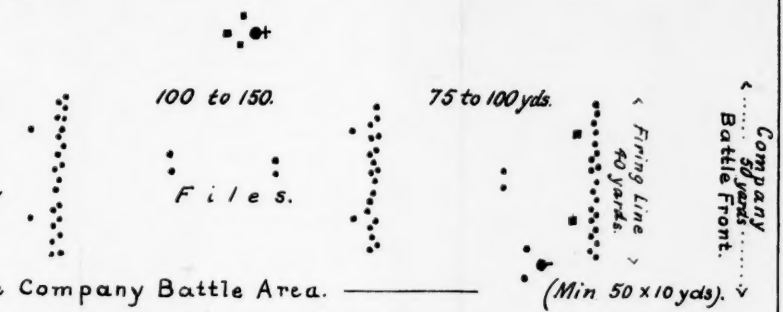
FRONT ELEVATION.

SHAPE OF IRON MOUTH.

The bag is presented

HARRISON & SONS, LITH. ST. MA

Fig. 17.



"First Line" viz. Firing Line, Supports and Reserves.

Fig. 23.

EXPENSE CARTRIDGE BAG

(See page 732)

MOUTH.

SIDE SECTION

IN USE, CLOSED.

presented to the R.U.S.I.

SONS, LITH, ST MARTINS LANE, W.C.

respect if not losses. But such positions would be only auxiliary to the main defence, for at best it can be but a kind of snap shooting. A few rounds would (even with cordite) indicate the exact spot on which an overwhelming fire from the outnumbering attackers would be promptly directed, and unless such targets are offered, the attackers would have nothing to fire at. The "artillery preparation" may yet at an early date become an anachronism. This kind of action on the defence is not strange to the English race. Instance the way Meagher's Brigade was received by the Confederates on the heights of St. Marye. Though possessing a splendid field of fire, they waited till the impetuous Irish were at 120 yds., then, in a few minutes, of the 1,200 men nearly a thousand (963) were destroyed.

Probably the rifles in Europe now are no better for this kind of effect than they were 30 years ago in America. Still bearing in mind the further improvements in the air, under similar circumstances, we can, I think, safely count on similar if not graver results. All attackers should guard against such losses. We must seek for a remedy, and, fortunately, we need not go far.

It is to be found in complete and systematic dispersion.

For the present, however, we will restrict the dispersion to an or "as great an extension for the supports, reserves, &c, as is deemed necessary for the firing line," and, when possible, with even greater intervals. It cannot, of course, exceed that of the firing line.

A glance at such dispersion. Take, for instance, the extension referred to in para. 4, p. 123. This allows of two sections being extended, two in support. At one man per yard the firing line would be 50 yds. long. Behind this the support *must* be. At medium distances it would form rank entire. Fifty men would then take up 38 yds. if touching. Now, referring again to the data for the 12-pr. shrapnel, we find that the proportion of effective bullets to square yards of area struck is approximately as 1 to 70. Now take the same 40 men we had before as supports in line, and let us place them at 8 yds. interval, and in rows 9 yds. distant. That is giving each man about 70 sq. yds. Then every such man would have 7 to 1 in his favour, whereas when in line we found that there was no favour, but dead certainty of a deadly kind.

Of course, it is highly improbable that every shot would be correctly burst. But correct shooting will be demanded, cultivated, and expected far more than heretofore as being more effective than rapid incorrect shooting, and the only means by which to meet the ever-increasing difficulties of transport.

Close and fan-like disposition for supports and reserves can, therefore, clearly no longer exist (Fig. 8), and our eyes must accustom themselves of necessity to the more modern columnar diagrams.

Échelons were at no time advisable. Besides having all the disadvantages of compact bodies, they caused delay in reinforcing, with lateral movements under fire, and in no way could escape being behind *some* part of the firing line, and thus offering a double target. The drill books now do not even refer to them.

The several points touched upon may now be recapitulated thus :—

1. "Depth" commands are obligatory to best sustain the fight. Commands are at their best when concurrent with organic units. "Depth" formation of units are therefore also obligatory.

2. "Lines" are now no more than mere segregations of those "depth" formations.

3. Our organic units being small, to obtain depth we must reduce the frontage of each.

4. The only frontage permissible for a company is 50 yds. Several of these give the frontage of a battalion.

5. Supports and reserves can no longer be in line or shallow columns and must take up the same frontage as their firing line (not more).

6. Distribution having the appearance of column must supersede fan-like or écheloned formations.

Based on this, I will now put forward a definite plan for a system by which the above deductions can be applied, in every respect within the meaning of the Drill Book.

I have called it the "Section Column" system, as being most appropriate. I admit it has a jarring sound to those for whose ears the word "line" is pleasanter. But after my explanation of the principles on which it is based I have no longer any fear that I should be misunderstood as advocating the retention of companies in closed section columns under fire.

Extracts from a paper which appeared in No. 103 of the "Journal of the United Service Institution of India," a year ago are now given, as briefly setting forth the details in connection with the "Section Column form of attack."

Battle Formations.

The company must be formed up in accordance with the Drill Book.

Every section must be divided into a right and left "fire unit." Each "fire unit" must have two to three "commanders" told off.

If a company has only about 20 to 24 files, it is best to work its four organic sections as "fire units." Another weak company will make up the 3rd and 4th (or more) reinforcing sections.

A company is hereafter assumed as being composed of about 40 files.

The Company.

The battle formation of the company is a "Section-Column" expanded to a front of 50 yds., and to a depth according to requirements, but not to exceed 400 yds. This forms the "Company Battle Area."—

The *length* of the "Company Battle Front" is *fixed* at 50 yds., and is composed of a firing line of 40 yds., with about 5 yds. on either flank as intervals.

The *density* of the firing line *varies*. It may be a line formed by a few men only as scouts (by extending, for instance, the front rank

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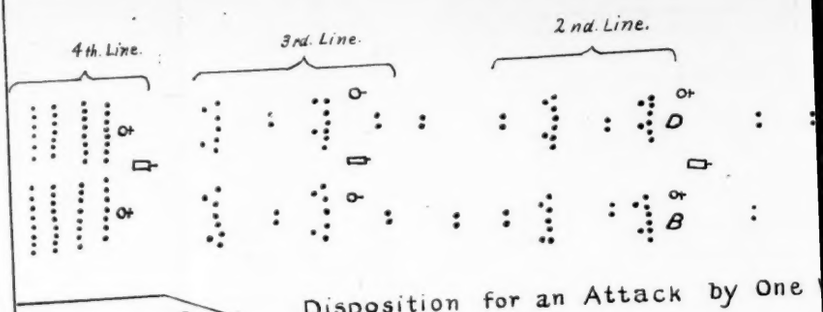
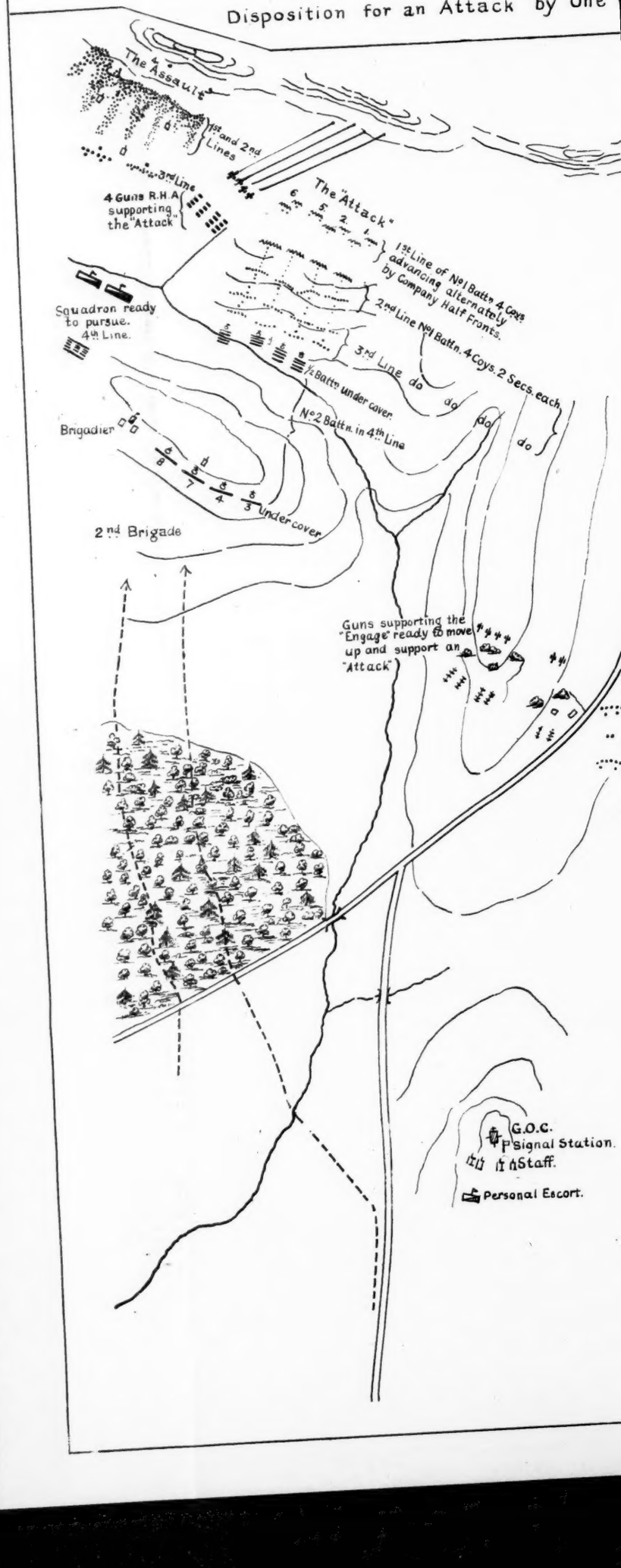
Fig 18.



Disposition for an Attack by One



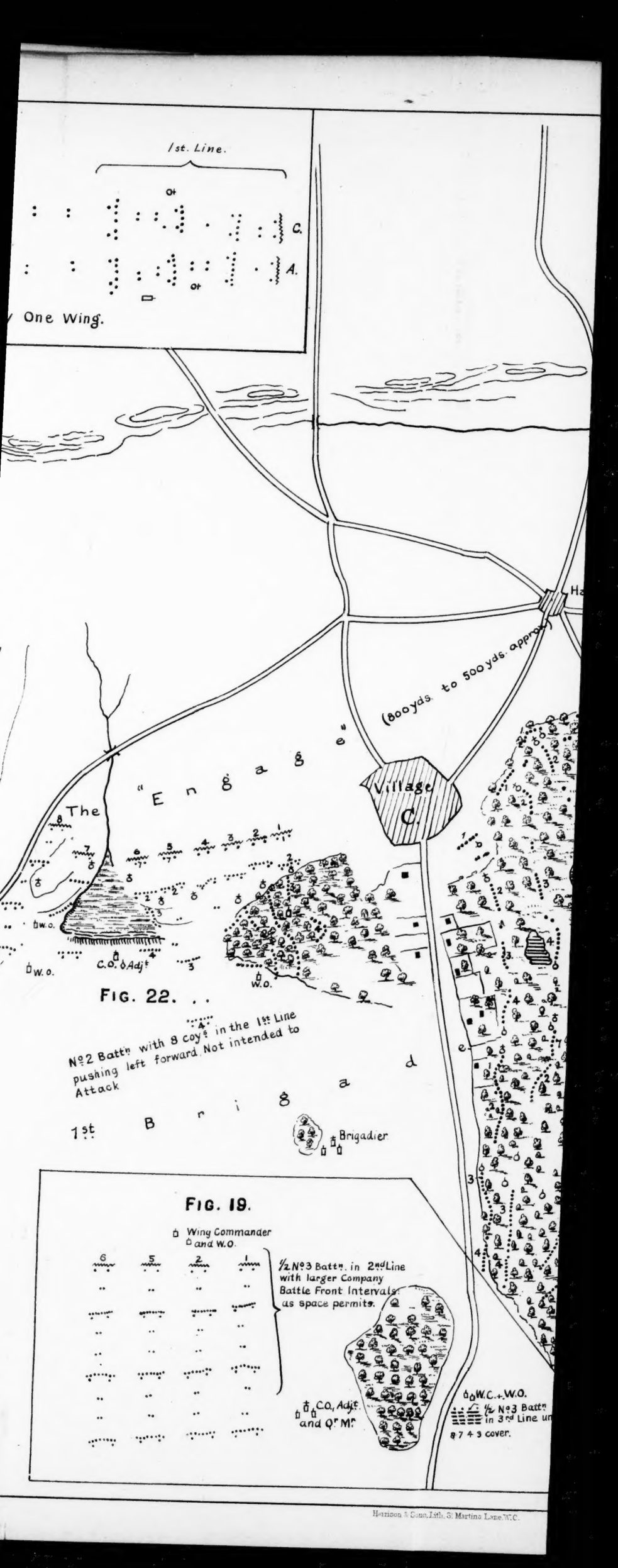


FIG. 22. . .

Harrison & Sons, Lith., S. Martins Lane, W.C.

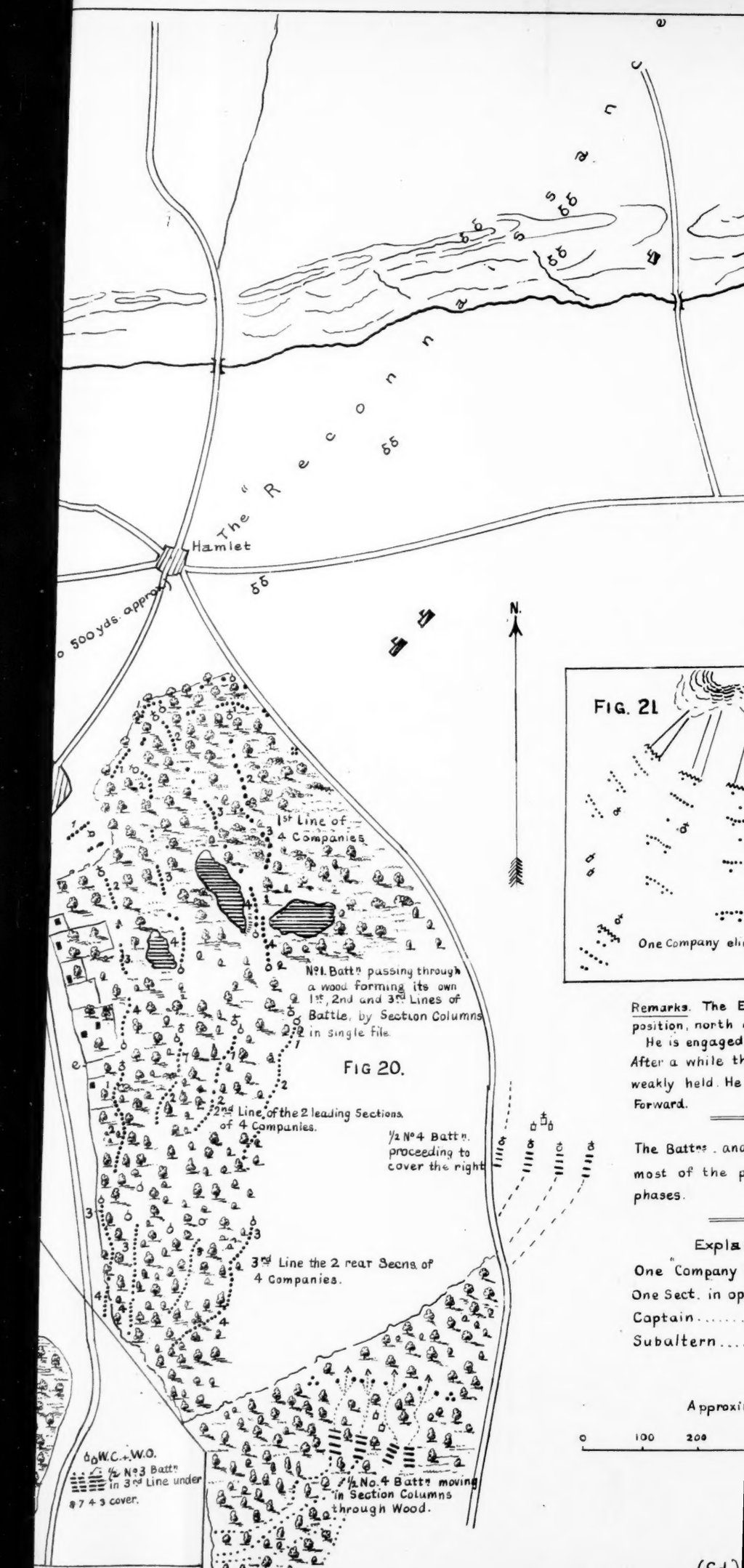

The "Reconn
Hamlet
500 yds. approx.
N.
1st Line of 4 Companies.
No1. Batt.n passing through a wood forming its own 1st, 2nd and 3rd Lines of Battle, by Section Columns in single file.
2nd Line of the 2 leading Sections of 4 Companies.
½ No4 Batt.n proceeding to cover the right
3rd Line the 2 rear Secns of 4 Companies.
W.C. + W.O.
½ No3 Batt.n in 3rd Line under 8 7 4 3 cover.
½ No. 4 Batt.n moving in Section Columns through Wood.

FIG 20.

FIG. 21

One Company eli

Remarks. The E
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(Sd.)

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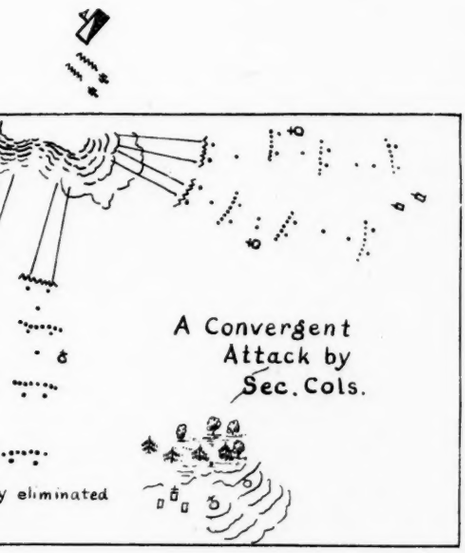

he Enemy is found in
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and Coys. are shown in
e possible positions and

planation.
ny Battle Front"
open formation .....
.....+
.....6

roximate Scale.

300 400 500 600 yards

d.) H. A. S.

of the leading section) to a dense "firing line" of two or more men per pace, according as to whether the company is taking part in an "engagement," an "attack," or an "assault." Whatever the density of the firing line, it is always divided into right and left "fire units" (sub-sections).

The captain is responsible for its being of a density appropriate to the work in hand.

The distances between the sections are also regulated by the captain, in relation to the casualties, and to the ground. For the first and second "zones," when under fire, the distances noted below would on open ground be appropriate.

Leading section,	20 men,	2 yds.	apart.		
Second section,	,,	,,	,,	following at	100 to 150 yds.
Third section,	,,	,,	,,	,,	,,
Fourth section,	,,	,,	,,	,,	,,

Connecting files every 50 yards for passing words of command and intelligence. These join the firing line with their own units. Fresh connecting files are immediately sent forward.

Whenever the ground passed over at any time makes it possible (undulations, wood, &c.), these distances must be considerably reduced. Say to 30 or 50 yards between sections. Expansion is only a method of protection against the enemy's bullets, otherwise it is a source of weakness.

A company thus formed up supplies its *own* "supports" and its *own* "reserves" for its *own* "firing line" under its *own* staff of commanders in its *own* ground.

Each company has thus a portion of the battle-field allotted to it, to work uninterruptedly till it can do no more.

As each section is divided into right and left sub-sections (units) the firing line remains from first to last organically divided into right and left "fire units" which support one another when it is desired to advance alternately by rushes.

When the last section of the company has entered the firing line, and the company battle front requires further stiffening, reinforcements will be made by a fresh company from the 2nd, 3rd, or 4th "line-of-battle," and it will work this company battle front in the same manner as the previous company; the new captain taking command of the company "battle area," and the new section commanders of the "fire units." The previous company is to be considered organically extinguished. Those of its men still physically capable and in possession of ammunition will remain in the new "fire units," the old section commanders assisting the new ones.

The captain is solely responsible for the dispositions of his company in the company battle area. His place is anywhere within it most suited to his responsibility.

The lieutenant will be on the directing flank of the leading section, some 10 paces in rear, and superintends the direction.

The 2nd lieutenant will be in a similar position behind the rear

section, and sees that connection is maintained by connecting files or signal with the majors or battalion commander.

"Unit commanders" move in rear of their fire units as soon as these open out. The senior commands the entire section as long as it works as a whole, but at all times volleys are given by "Units" and not by extended whole sections.

Each section commander is responsible for a regular and unbroken connection with the section in front of him, and will send out connecting files as required.

Each section must slavishly follow the track of the one in front, however tortuous, however straight, and will strive to keep close up to the front whenever cover permits.

The intervals in the firing line will be kept from the centre of each fire unit; whose commander is responsible for the direction.

The Battalion.

The battle front of a battalion is composed of two or more company battle fronts.

Whenever possible the same battalion should form the 2nd and 3rd lines of battle, if these are needed; in the same way as the company forms its own supports, and reserves, in the first line. After entering the attack stage, the advance must be by rushes, covered by a *heavy fire* up to 150 yards, the firing line being steadily reinforced by the sections in rear, whether of the original company or of those following.

A "company battle front," to be carried into the enemy's position, may require to be "fed" by a dozen sections one after the other. These should belong to one and the same half-battalion or battalion. These are *at first* divided into 2nd and 3rd "lines," but this distinction is quite lost on approaching the position.

A half battalion (four companies) would ordinarily attack with two "company battle fronts," and two companies forming the 2nd and 3rd lines.

A battalion similarly could have four company battle fronts as in Fig. 19, where the companies are shown numbered as if placed for a serious home attack. Each company battle front has thus eight sections to feed it.

At *least* two sections should be kept per company battle front, and not be allowed into the firing line. If all the sections (but two) are absorbed into the firing line before the attack is desired, an attack can hardly be made if the enemy is at all in force.

The companies of each half-battalion should be kept behind each other.

The rear-section commanders are responsible that the battalion commander is always kept touch with, by dropping the necessary connecting files, and by looking out for signals.

The battalion commander, assisted by the mounted officers, keeps constant touch with the company officers in the battle area, by means of a regimental system and communication, verbal or by signal.

The several methods of employing the companies of a battalion are shown in Plate.

The advance during an engagement in the open should be in a general line by the right, left, or centre, the inner fire unit commanders being responsible for the direction of the company battle front, and for the intervals between them. In wood or jungle it can be made by the sections in file. In broken ground (or cover) an advantageous position for any one or all the sections of a company should be secured by a rush, and retained as long as its fire is not masked.

Company commanders should have the greatest liberty of action within their own battle area, the only lateral link between companies being that of *mutual fire support*. When one company battle front is checked, the neighbouring company battle front's concentrate their fire on the obstructive object.

The fixed intervals must not be reduced, but may be extended to suit the action of the battalion as a whole. A battalion with plenty of room can make an enveloping attack by increasing the intervals between companies which converge on the objective. If a convergent attack causes overcrowding in the "1st line," the commanding officer must eliminate one or more companies by causing it or them to lie down; the others will soon reunite into a general line. The company battle front must, however, on no account be extended. It is fixed at 50 yds. *whatever the strength* of the company.

The Brigade.

A brigade will engage by employing its battalion in the manner above explained.

Even if a brigade forms only *part* of a general attack, it should form its own 3rd or 4th lines. If the task before it is a serious one, the battalions should be so arranged that reinforcements to the 1st line, from the 2nd and 3rd and 4th lines, should belong to the same battalion.

The principle being to make all reinforcements from "rear to front" and from portions of the same organic unit.[1] This ensures cohesion of command and unmixed ingredients in the several battle fronts to the very last.

If the action is expected to be only an "engagement" by a 1st line, then all the companies of one battalion could be placed in the 1st line, with another battalion in the 2nd and 3rd lines in case of accidents or unlooked for after events.

Note 1, *Officers.*

All officers must always have a "guard" (one man) to assist in conveying orders, and to protect the officer engaged in supervising all parts of his command from treacherous attacks by wounded

[1] *Viz.*—Sections as minimum to the battalion as a maximum. The brigade is a conglomeration and has no organic vitality.

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enemies, or from ambuscade. The company commander has the bugler near him also, and a signaller in mountainous country.

The captain must keep the battalion commander informed of anything which he thinks his commanding officer may not be able to see for himself.

All communications should be in a low voice or by signal.

The captain adopts on his own initiative any formation he thinks best suited to the circumstances. His one object is to keep his firing line up to the required strength.

At drill he regulates the "fire effect" by directing the number of casualties without which no sound practice of reinforcement is possible.

The company commander has complete control of the company battle area, until the leading section of a reinforcing company arrives in the firing line.

His command of the battle front then ceases.

Company officers give no executive words of command in the battle area, except "Follow me" at the assault stage. All else must be given as "instructions" to the section or fire unit commanders.

Company officers cannot have a too high appreciation of the importance of the company "battle front." On its efficient working depends the result of battle. How to improve it by further training the individuals concerned, should be always on his mind.

When in "solid lines," section commanders must merely see the captain's orders carried out. Volleys must be by companies, for a "company volley" is more effective than four "section volleys," on the same principle that "section volleys" are more effective than the individual firing of the men comprising it. The shouting of four men, each endeavouring to shout the other down, causes a babel of undisciplined confusion, which is obviated by the command being retained in the voice of *one* commander. For all "firing" the *letter* of the company must be used, for it is unalterable, whereas the battalion number is frequently changed and often "disremembered."

The later drill books attempt a distinction between "parades" and "exercises." The newest will entirely separate them. This cannot be too strongly emphasized at inspections, though it will take some time before the distinction is fully realized by all.

Parade and review "exercises" are for the purpose of proving the discipline of *matter*, with a subjected intelligence. Precision of movements with smartness in handling arms is the principal requirement. This is reversed in all field "exercises." Discipline of the *mind* is the chief requirement here, and any attempt to make the men retain in their minds a desire to make the hands "tell" together on the rifles will materially mar our efficiency.

On all such occasions these euphonious formalities must give way to the really important points in connection with the *true* "handling of arms." The correct adjustment of the backsight may take one man a little longer than another. Hence must be allowed independent individual action. When sights are adjusted, men should look to the front, instead of looking to the right or left, or make a

pause for appearance sake. For good results the men also require to get into a comfortable position before firing, if it even brings about several movements of the body. The "present," too, should only be obeyed subject to a man being able to see the object named.

By several men abstaining from coming to the "present," silent indication is given to the commander that a shift of ground is advisable. It is a sign of the men being still well in hand. The "fire" should, as long as possible, be given "together," yet there is no objection to ragged volleys. If the men are at all extended it is in fact preferable; being less of a strain, it might ensure a better individual aim, and might therefore give better results.

In the field, words of command must be minimized (D. B., para. 125). The following may be frequented omitted—(1) "No..... Section." Men must get to learn the voice of the commander, or learn at once to obey the command applicable to them. All men within 10 yds. (when not in solid line) of a command should obey it. This 20 yds. (10 yds. on either side) is the largest "section command" practicable for good work. In the section-column attack each company firing line can have only *two* section commanders, one right, one left; this obviates all doubts as to which voice to obey. (2) "Volley firing" or "Fire a volley." All firing is by volleys unless otherwise specified. (3) "Ready." In the firing line soldiers should at once reload after each discharge. The illustrious records of the British Army of bygone days were wrought by men who loaded immediately after discharging the muskets, except, of course, just previous to the final charge; and there can be no advantage in allowing men in the battle "front" of the present day remaining even for a single moment "*un*-ready." Our mechanisms are perfect, and there is no more chance of the rifles going off now when loaded at the "full cock" than in former days at the half.

Note 2, *Reinforcing.*

A fresh company "reinforces" the firing line, but its commander "relieves" the former commander of his "command."

The captain of the "relieved" company on being relieved of the command of the battle front, will, at *his own* discretion, either direct the remnants of his company to proceed with the new company at once, or direct it to lie down and then re-form.

It is the old captain's first duty to assist the new captain (whether senior or junior) to his utmost. The best way for doing this might be in first giving his men time to collect themselves under cover, and to replenish pouches.

This done, he could once more join in the fight as a reorganized unit with an improvised battle front of his own selection wherever a suitable gap appears.

If under a hot fire in the open, and the attack is approaching the assault stage, he would perhaps best struggle on with the fresh company, borrowing ammunition from it if possible, or if he thinks the

attack is making good, he can make his men lie down, take a pull at their flasks, and munch a tablet of cocaine.*

(* *N.B.*—Three of these should be in every side pouch for extreme cases of exertion.)

The reinforcing company from the second or other lines of battle must bring up reserve ammunition to dispense to the troops engaged.

The captain of the company will see from the appearance of the track he passes over the strength his first line should have at the outset.

It should come up strong, and together, and open fire by regular volleys except when coming up at the assault stage, when independent firing will be at once begun. Feeding by driblets is discouraging, whereas fresh sounding volleys encourage the attackers and demoralize the defenders.

Reinforcing, with the change of commanders, requires practice, as also the sub-command of right and left fire units, which, when the last section has reinforced, will probably contain men belonging to the four *sections* but all of the same company.

A rapid assumption of command and a rapid submission to new commanders are essentially matters for frequent "drill."

Note 3, *the Attack.*

The transition from the "Engage" to the "Attack" is a serious matter, which cannot be taken out of the hands of the battalion commander (or senior). When definitely ordered—*e.g.*, "The 45th Sikhs will attack"—the firing line will be at once made as dense as possible (if not already so) by the captains reinforcing to one man per pace. This done, the captain will signal to the unit commanders to "advance," which must be steady yet quick, in as general a line as the ground permits.

Rushes *must* be made over open ground by a company battle front at a time, or when a company acts singly, by "units" at a time. Right leads always. Rushes not less than 40 yds.

Fire must be kept up without ceasing, to "crush" the enemy. At least three volleys for every rush.

The firing line must be kept up to one man per pace, reinforcing sections must be close up, and doubled in (sections at a time) as soon as casualties permit.

The *least* danger lies in pressing on quietly, steadily, yet quickly.

On the "Attack" being ordered, the sections in rear will close up to 80 or 100 yds. No greater intervals between two and three lines. The rear sections must smartly run up as soon as they see the section in front move on.

All ranks must LIE DOWN as long as bullets are circulating, cover or no cover. Men firing only assume the best position to fire in.

Note 4, *the Assault.*

The company first in a battle front will rarely be able to "assault."

The second company may. The third must, otherwise the "attack" has failed.

The attack advances in as dense a line as possible (one man per pace) to within 150 yds. of the position, when, without further orders from the rear, magazine firing commences, and must be kept up till the enemy's fire slackens or ammunition is within a few rounds of being expended. Whistles sounding, the position is rushed.

The firing line is the assaulting line. On reaching the position the assault will halt and lie down; company commanders only stand and look to the battalion commander for signal or order. The assaulting line under *no* circumstances crosses the position without definite orders. These may be to continue the rush forward and follow on the heels of the enemy, or to at once open fire on the retreating enemy, or to re-form under cover of the fire of the sections which have not taken part in the assault.

On hearing the independent firing commence, the sections in rear (whether of the 1st, 2nd, or 3rd, or other lines) will at once close on their centres, to loose intervals in single rank, and move up at the double to 30 yds. of the assaulting line, where they will lie down and wait for battalion orders. These may be to cross the position and open fire on the retreating enemy, &c., &c.

On being ordered to, the companies will re-form in line of section-columns and replenish pouches.

Note 5, *Casualties.*

The company firing line is fixed at 40 yds., which gives sufficient room for 40 men, viz., two sections.

This is the thickest useful density possible, and it must never be exceeded except at the assault stage.

The 3rd and 4th Sections will *therefore not be able* to get into the company battle front *unless casualties occur.*

When a strong section sends forward reinforcements, it should usually do so by a "rank" at a time, and not by spreading out half-sections. This will keep the men of the right and left half-sections (units) together, each in the right and left "fire units" of the firing line.

Casualties must always be practised.

To reinforce with the 3rd and 4th Sections, unless gaps are made, is bad instruction, and therefore punishable.

The "advancers" trained to seeing men on the ground and passing over them at drill will think less of the matter in war. If trained to the fact that the denser the track of casualties, the more rapid the reinforcement must be, the purposes of drill will attain the greatest results in war.

No. 6, *Rallying.*

The proper course to pursue after reaching the enemy's position depends so utterly on *unknown* and *unforeseen* circumstances, that to

lay down any rules or distinct orders for action is professionally wrong. Principles only can be enunciated.

The defenders will either stand to be bayonetted or they will evacuate before the assaulting stage. *The earlier the evacuation the greater the necessity for caution.*

The proverbial "3rd line" surrounded by a swarm of 1st and 2nd line attackers reaching the position breathless, advancing firing volleys, and "*rallying in lines*" so many paces behind each other, &c., &c., will form an acceptable target to any artillery the defenders may be still possessed of. It would not take long to break up these desired "three lines."

The practical course is either for those units which come up formed to quickly pass *through* the position into unranged ground well beyond the position, and there to fire at the retreating foe; or *not* to cross the position at all till after a careful look round. No troops should cross the position without special orders.

All rallying of *remnants* should be on the attacker's side of the position.

The only fixed rule that can be laid down for these is for "companies to re-form under the nearest cover, lie down, and wait for battalion orders."

For this system I claim the following advantages:—

1. The companies have each a battle front of unalterable dimensions, suitable for every circumstance of the battle-field, in open, close, woody, rocky, or any other kind of ground.

This permits of the men and officers being *drilled* on one plan, allowing of the highest perfection being attained in time of war.

2. With a fixed front, the battalion commander can suit himself to any frontage allotted by the brigadier, without any tedious and often misunderstood instructions.

3. Admixture of organic units is abolished.

4. With companies and battalions fighting side by side emulation is stimulated, and confidence developed to the highest by being supported by known comrades.

5. Control of the firing line can be retained to any desirable extent by the commanding officer in rear.

6. Information can be passed back and instruction sent forward rapidly without exposure. As the individuals of the chain are known to each other more rapid conveyance of intelligence is assured.

7. Direction can be better supervised at the front and from the rear.

8. Flanks are better protected, such attack being met by one commander instead of several.

9. The length and strength of the firing line can be regulated to a nicety. The whole or only a part can be withdrawn by halting, as in the case of a convergent attack, the crowding hitherto so usual being the surest way to court disaster.

One portion can be pushed forward, direction can be changed, and troops merely "engaging" can be at once sent to attack without any rearranging.

10. The section column formation is suitable for all kind of military work from parade to battle with the least amount of exposure and fatigue.

We cannot, of course, forget that all such attempts to reduce losses on the battle-field are scoffed at by some German writers and their imitators. Nevertheless, is it incumbent on all Englishmen, and especially the more intelligent portion of our profession, to see how casualties can be reduced to a minimum. The most noble victory, I take it, is that gained with the least amount of bloodshed, and any unnecessary loss, caused by mistaken formations, should be considered criminal.

The German saying is "losses have to be faced and not avoided," but, like most aphorisms, it is only partially true. For obvious reasons it is our duty to do all we intelligently can to avoid losses, and then, and then only, unflinchingly to face what cannot be avoided. We need no guiding axioms as to this latter. It is the former which will test our discipline most.

Dispersion of individuals to the utmost extent compatible with good supervision is the only remedy left us by which to avoid unnecessary loss. Many methods such as shelter trenches, portable shields, have been discussed before now, but as yet they are impracticable. Greater and greater dispersion with the horizontal position is the only course left.

We have it clearly recognised in principle in our Drill Books, but the traditional past and fear of loss of control are two factors which are continually preventing the principle being put into practice of our own accord in times of peace. In war unsystematic dispersion is forced on us against our will. Far better is it to drill continually at doing it systematically. Rows of eight to ten men, three or four paces apart, under a fire unit command form insignificant targets, and are yet well in hand, to feed the more dense firing. My own experience (gained in a small way) makes me feel confident that such a dispersion can be effected in British and native regiments without any loss of control, and looking ahead I can see a battle-field covered with individuals, making steadily for the fighting line in front, and who, owing to their dispersion, offer such a bewildering target to the enemy as to materially interfere with their fire effect. The absence of targets nullifies the advantage of discipline and fire control.

The aspect which a battle-field would have if thus occupied would no doubt be novel. But so was the appearance of our thin red lines advancing to the banks of the Alma. Under the amused eyes of the officers and ladies on the Kurgané unflattering remarks at our skill and mode of conducting war were no doubt freely made when comparing our formations with those of the French and their dense columns beyond.

Similar remarks would also, no doubt, be made when on some future occasion—instead of advancing as before in solid lines—we cover the ground with individuals dotted promiscuously about, seemingly without control.

The enemy this time perhaps adopting, in spite of his former ridicule, lines instead of columns, would wonder at our curious proceedings. His inability to seriously damage these scattered troops who are quietly filling up gaps in the steadily advancing firing line, the only solid element in view, will soon bring home to him that ridicule is as misplaced on this occasion as it was then.

In the definite proposal made in this paper the extension is still short of the fullest possible. As a first step, however, towards attaining perfection the preservation of section columns may be easier to adopt to begin with. But we must practise patiently in peace what has to be done in war.

The very last time our troops were going into battle the General-in-Chief intended (and probably ordered) a certain formation to be taken up which was best adapted to the work in hand. It was, however, resisted from below because the "formation intended was not one laid down in the Drill Book," and the brigadiers found it easier "to adopt established formations, and accordingly they all deviated" from the mode of attack ordered. This is a grave charge to bring against officers in the presence of the enemy, but the reasons for its existence are those inherent in human nature. Those who have held commands well know this exasperating *vis inertia* to all orders for action out of the common grove.

The eve of a battle is, without question, a ticklish time to inaugurate a new system of attack. Yet as the Drill Book leaves several ways open by which companies may be thrown *into* the attack, we shall have the same kind of intentions misunderstood and resisted again and again, perhaps on the battle-field itself.

Under no circumstances can it be said that this is an attempt to make a standard "plan of attack." The plans of an attack or of a battle can still be varied and manifold though the companies are to fight on a definite front, just as houses are built on many designs yet using the same sized brick. It is obligatory to drill men in peace-time in the best way they can use their arms, and a fixed method applicable to all occasions will permit of rapid action, without unnecessary and often misunderstood explanation at critical moments. "So many companies in first line, so many in second," is all the battalion commander need order after having mentally divided the frontage allotted to him by the brigadier. Each company commander, section commander, and private knows exactly what he has to do without another word of instruction. Nothing can be simpler, therefore nothing better.

Before leaving this subject I would refer to two or three specific points intimately connected with the proper conduct of the firing line.

First.—As to our custom of not reloading (in the infantry) until the word "ready." In the firing line men should be "ready" at all times, to meet fleeting opportunities. Beyond doubt many lives have been lost, as well as many opportunities for inflicting damage on an enemy, by the retention of this ancient custom. Artillery keep their

guns shotted from the moment of entering the sphere of action till the final cease fire. Sportsmen load after each discharge before taking a step.[1] Why should the infantry be different? The reason ordinarily given is that it controls fire and keeps the men steady. Many years ago, during a discussion as to the merits and demerits of the Zündnadel, a gallant officer of high degree, in answer to some remark of mine as to our being so slow in adopting breech-loaders, tried much to impress me with these words: "Young man, you do not know (with a solemn shake of the head) what a steadying and calming influence there is in having to press the cap down on to the nipple with the thumb." And this whilst the lesson taught in the streets of Gitchin was still in the daily papers. The same risible feelings which came over me then possess me now, only with a mixture of sadness, when I hear about its steadying and calming influence of keeping men "unready" under fire. Old notions of smartness and discipline must be more rapidly removed than our natural conservatism likes if some day we are not also to be taught an object lesson on this point. The soldier who is caught "unready" fumbling at his breech-bolt whilst suddenly charged by cavalry or savage in ambush, may well curse the system which finds comfort in "steadying influences" similar to those supposed to be inherent in "cap and thumb" precautions.

Control lies in the word "fire," not the word "ready." When the latter was introduced it meant "load *and* adjust your sights," now it *only* means "load." Let us return to the word "load," but only for the *first round*, after which let it be thoroughly understood that a man at once reloads and remains ready to fire, and that he only unloads on the general cease fire or by specific word of command. And let this rule be extended to the "solid line," where more than ever the "mowing" effect is required.

The *second* point is even more important. Our men carry 10 to 15 packets on entering the battle area. These are all packed away in pouches or a breast pocket. On a packet being broken into the rounds are placed in tubes provided for the purpose. These rounds expended, a fresh packet has to be opened. How? He either places his rifle upon the ground or stands up with it between his legs, or in some other awkward position, and, one by one, has to place his rounds into the tubes. Obviously, if not under cover, he is at a great disadvantage. What he wants is a bag at his right hip into which he can drop the fresh packet, pull the string, remove and throw away the paper, all in a twinkling, and have the rounds loose yet secure in the bag, into which he can put a sweaty, swollen, or frozen hand without effort and loss of time, and so rapidly load. When the cease fire sounds he can at leisure place the remaining loose rounds into the pouch tubes.

The additional service pouch is in every way quite unsuited for this purpose. It is a sacrifice to appearances. On an emergency men use their haversacks for this purpose, but a misuse of articles of

[1] Last year in India two such paid with their lives for neglect of this rule.

equipment is an insult to our intelligence. It is moreover unwise to make the men throw away the little food they may have about them on going into action. The absence of the bag advocated may some day be the cause of a catastrophe.

The magazine does not help us out of the difficulty, for after a minute of that we are as before with a single-loader.

The proper article can easily be devised. It should be similar to the best kind of sportsman's bags. But I have here a pattern which has been tested severely, and meets every requirement (Fig. 23). It can be folded flat on the right pouch, and, if not in accordance with some ideas of smartness, looks business-like, and therefore to the purpose.

The *third* and last point relates to distinguishing the units on the battle-field, on the line of march, and in camp.

Our forefathers knew what they were about when they introduced "facings" of different colours. Officers and men with green cuffs flocked together; Buffs, Royals, and Pompadours could be segregated under the hottest fire.

This is more difficult now at home, and frequently impossible when fighting in khaki out of the United Kingdom. A return to variegated cuffs and collars is not advocated, but some means ought to be devised to keep the companies together. I would propose a brick-red flag (2 ft. by 2 ft.) on which is a large white company letter. The captain's guard file or bugler or signaller could carry it folded on a light cane, which could occasionally (on the march, or in scrub, high crops, &c.) be fixed into the muzzle of the rifle; and frequently used for company signals it would be a source of great convenience. In the assault it would be an encouraging guide, inconspicuous to the enemy, yet visible to those whom it concerned.

These three points if given effect to would, I feel sure, materially assist matters, and would be at least practical precautions towards keeping the units together, in as organic form as the circumstances permit, to the very last.

Lieutenant-Colonel GUNTER: I think members of this Institution are very much indebted to the lecturer for giving us the result of his studies and practical efforts to solve the difficult problem of infantry attack, and for the able and moderate way in which he has brought forward his views. He has confined himself, he says, to the limits of the Infantry Drill Book, 1893. This, I venture to think, was wise, for that book is elastic enough to satisfy the most indiarubber-minded of tactical politicians. The lecturer deprecates any possible suspicion that he wishes to formulate a normal scheme of attack, but inculcates the important principle of making every effort to preserve discipline and tactical cohesion amid the turmoil of battle. In this I should like to offer him my cordial support. Much has been said, and much has been written of late about the necessity of practising what has been aptly styled the "pell-mell" in attack, because its advocates say confusion is inseparable from the terrible earnestness of the slaughter when troops attack defenders armed with magazine rifles. I am not one of those who advocate this. This "pell-mell" has, like our own Pall Mall hard by, its shady side. In the intense excitement of battle men do instinctively what has become habitual to them, either from natural or acquired habit. If our soldiers are to be habitually taught that when the supreme moment of the assault has come "pell-mell" is the word, then there is a danger of all self-control and attention to orders and discipline

vanishing. If, on the other hand, they are thoroughly trained and habituated to collected, concerted, well-directed action, they will instinctively, even if dispersed, reunite their scattered fragments in such order as they have been accustomed to, for they will feel that in this lies their safety and power for victory. It was by the discipline of small units that the Germans gained their victories. It is by discipline that our glorious victories have been won in the past. They have been due as much to that as to the splendid courage and endurance of our soldiers. The best football team is that which is best disciplined, where every man knows his place and work. The love of order is inherent in Englishmen, and the British soldier has, I think, a dislike to any hugger-mugger arrangement in drill. He easily falls in with any plan for keeping order and maintaining discipline that is simple and practical. These elements are essential. The introduction of smokeless powder gives an advantage to the attack, it facilitates control. It behoves us to make the best of this, and to endeavour not to formulate plans of attack, but to work systematically to maintain this control, not to build up artificial schemes for the distribution of troops, but to work for this object with the natural sub-units and fire units as a means to the end, which is the capture of the position. These ideas are not merely theoretical. Officers who study what is taking place on the Continent will notice that though many officers there advocate the pell-mell attack, yet such able, practical, and experienced tacticians as Von Scherff and Meckel and others are against this attempt to practise chaos, which comes soon enough of itself. The principle of working the attack by sections is not new. In 1878 Sir William Olpherts brought it to our notice in a lecture here. He told us that it was brought to his notice when in command of the Oude division by Colonel Bigg, commanding the 5th Fusiliers. Without binding myself to the details of the plan as proposed by the lecturer, I think we may say it is thoroughly sound in principle, because the men are accustomed to work by sections and sub-sections, and it is in this way that the system of working by groups under group leaders can best be taught and inculcated. The principle of working by depth instead of by breadth is thoroughly sound, and is well brought out in our Drill Book. This may, perhaps, be carried too far. I am not quite sure that it is wise, as advocated by the lecturer, that the whole of the battalions should be used up to feed the fighting line. I think we work a great deal by battalion, and I think the brigade commander should have one battalion intact as a reserve. Tactical strength lies in keeping a reserve in hand, and every brigade should have one battalion always kept in hand. I cannot also quite agree with the lecturer in regard to the preparation of artillery fire being unnecessary. For an attack to be successful I think the artillery fire is of the greatest importance, and if we neglect this in going to war against troops armed with modern artillery we shall suffer disastrous loss. In conclusion, I repeat, confusion is inseparable from the attack, but let us with British soldiers and native soldiers acting with them put off the moment of dire confusion as long as possible. By this we shall earn and maintain the confidence of our men and lead them to victory.

Colonel DOONER: I am quite sure we all feel very grateful to Colonel Sawyer for his very interesting lecture. But I think there are one or two points in it that certainly require much consideration and discussion before any commanding officer would attempt to be justified in adopting them. He has in his lecture dwelt on the importance, as has been mentioned by the last speaker, of command in depth, which now happily is borne out greatly, and given to us and ordered in the infantry drill. The advantages of commands being in depth most of us are not unaware of, and they are, that mixing of units is avoided as long as possible, undue extension is guarded against, and also the commander of the front line has his own reserve behind him under his own orders, and can, therefore, feed the firing line as required without reference to another officer. But now, having said that much, I hardly think many will agree that some of these formations that we see on the board there are the best for either a battalion or a brigade attacking. If we carry out to its limits the idea that we are to have sections of all the companies of a battalion in the firing line, or in a brigade—to have all the battalions represented at once—the brigadier or the commanding officer has no intact reserve left. They have no complete reserve under their own command, and they have to turn round to some

other officer to ask for some help should they require it, and should the whole of these units chance to get used up, there is no reserve of any kind belonging to the unit concerned. Then again it appears to me, looking at the board, that in most of the formations that Colonel Sawyer has advocated, it must have made the heart of many a cavalry officer, if there are any such present, positively delighted, for I cannot imagine any better formation for a regiment to be caught in in flank than with all these numerous small bodies in positions in which they are unable to assist each other. In fact, I fear they would be perfectly helpless if by any chance they were caught in flank and cavalry got in amongst them. To go back a few years, when we remember what took place at Königgrätz, Custozza, or Mars-la-Tour, it is a little unwise, I think, to imagine that the day of cavalry on a battle-field has gone; and, therefore, if a battalion or a brigade were caught in flank, or even obliquely, by cavalry, in such a formation as we are given there, I think we must all say, "God help them." It may be well to ask, Why is it proposed to put these eight sections in the firing line? Simply, I presume, to prevent the mixture of companies in a battalion. Now I scarcely think that it is necessary to trouble our heads so much as is done by some about this mixture of companies in a battalion. The officers of a battalion are very well known to all the men in the companies; and, therefore, it appears to me scarcely necessary to always be attempting to devise some system of attack by which this mixing of companies in a battalion will be prevented. Of course in attacking put it off as long as you possibly can, but I do not believe we need go into such complicated formations as that, to try and avoid mixture of units in any well drilled or well regulated battalion. If the commanding officers only get a chance when the reserve men join of drilling and instructing them for a short time, so that the officers and men may be known to each other, I think there will not be much trouble, even if the companies do get a little mixed. When we come to mix the battalions in a brigade or a division, of course, it is a different matter. It is a difficult subject to deal with, but when we remember that in the Farm House of St. Hubert, on the 18th August, 1870, there were portions of seven regiments, not battalions—the men of seven or eight different regiments mixed up, twenty-one battalions or more in all, I do not think as the battle on that occasion was won that we need fear so much about even our own battalions getting occasionally mixed; as I said before, avoid it as long as possible, but we must try and remedy it more by drill and order and discipline. No human mind, I think, can really devise a scheme by which a mixture of units will be prevented, at perhaps the final stage of the attack; by mixture of units, I mean the companies of a battalion. In the scheme which Colonel Sawyer has laid before us the captain of the company disappears apparently; the other unit comes on, and then the officer who has pushed forward almost up to the last point is suddenly to be relieved by a section of another company, probably under a junior officer. Colonel Sawyer does not say quite what the officer commanding the company is to do. I presume, if alive, he is to lie down or wait, and he is thus to give up to another what he has worked for and apparently won so well. I do not think that will be quite a fair result for all his labours. The company is then to be organically extinguished, and I venture to think such noble and splendid service as that done by the company, or whatever may be left of them, should not be sacrificed. Then again, in case of an advanced or a rear guard, what is to take place? The lecturer has not told us that. We know, of course, that advanced and rear guards are justified in taking up a broad front far more than is taken up when attacking under ordinary circumstances. The commander of the advanced guard knows that his friends are behind him; the rear guard knows perfectly well that they are only trying to impose on the enemy, threatening to fight without fighting, and therefore can adopt these broad formations. How is it to be done with the formations placed on the black board before us to-day? The lecturer has referred to the "beaten zone," where troops are exposed to shrapnel fire. I was hoping that some artillery officer would have preceded me in this discussion, and perhaps would have referred to the calculation made by Colonel Sawyer, and the ground which is stated to be covered by the "cone of dispersion" on a shrapnel shell bursting. In the lecture, as far as I can gather, the cone at 1,800 yds. is stated to cover a front of 20 yds. by 500 or 600 yds., and from this a calculation is made by which 70 square yds. in area are given to each

bullet striking, the bullets in each shrapnel shell being taken as 141, they are I think more. But the "cone of dispersion," if I remember rightly, is nothing like so large as that mentioned by the lecturer, it is not half the size, I think; and, therefore, I venture to maintain with shrapnel, when you are exposed to unaimed fire, your supports and reserves—and here I think the Infantry Drill is perfectly correct—will be far less likely to suffer in the formations we are directed to adopt instead of in those which Colonel Sawyer advocates. Then, again, in the drawing on the black board of the height of the trajectory of the Lee-Metford, there is an error there I think too. I do not know where the lecturer got his figures from, but if my memory serves me, at 600 yds. the highest point of the trajectory is only 6·7, but when it comes to 700 or 800 yds. it gets much higher; and, therefore, the beaten zone at 1,500 yds., I think I am quite safe in saying, is not as given, the highest point of the trajectory would be three or four times 8 ft., as I see it is drawn there.

Colonel Sawyer: It is 7 or 8 ft. That diagram does not refer to the Lee-Metford.

Colonel Dooner: I thought that referred to our present rifle, and that the beaten zone was as put down there; I can only, in conclusion, again say with regard to the numerous small sections into which it is recommended to form battalions and brigades when attacking, I think it would be a most favourable opportunity for cavalry to charge down on either a battalion or brigade, and you may be certain there would be some commanders of cavalry—a Seydlitz or Scarlett will perhaps be there—looking out for such an occasion, and these formations to my mind would give the very opportunity that all cavalry officers would be longing for.

Colonel Keyser, C.B.: My principal objection to this otherwise most excellent system is that it seems to me in this section formation there are a great many—too many—commanding officers. It is all very well to say the whole is under the control of the captain, but my experience is that when section commanders take command of sections either, when the firing begins, the sections all get huddled up together or else they are so far apart as to be altogether away from the control of their different captains. That is the only point that suggests itself to me not mentioned so far. I may be wrong, but I do not like this very much divided command.

Colonel Trotter: I would ask the lecturer whether it is intended that the lieutenant should lead the section?

Colonel Sawyer: No.

Colonel Trotter: He has always to look after the direction, and I fancy he nearly always has a difficulty to get the fighting line to keep proper direction. By your paper, as I read it, the lieutenant is to look after the direction. Is that intended?

Colonel Sawyer: To see to the direction as regards touch of direction; not as regards the front direction.

Major-General R. D. Barrett: The strong point about the lecture has been, to my mind, the large extension of units in any case. I think the section system is a mistake. The lecturer has laid down that the frontage of a company should be about 40 yds., but by breaking it up into sections, each section must extend itself so as to cover the normal front of the company. My idea is that there should be no extension at all. You can get the same frontage and have your files open and in good fighting order without any extending or closing of files. I have tried the plan, which seemed to me to answer very well. If I wish a company to extend in extended order, I would order the company into four-deep formation. I would have that company in four ranks. Under those circumstances the men reinforcing the line would stand as they came up to reinforce side by side with their comrades. Captains and subalterns would have all their men under control. I do not think there is anything further I have to say.

The Chairman (Sir Redvers H. Buller): I should like to say a few words before the lecturer replies. This is a subject, as has been said, that is of the greatest importance to all infantry officers. It is one which stands a good deal of argument, but it seems to me that the plan that has been put forth to-day in avoiding one difficulty has rather erred in taking the extreme of the other. In dealing with the

question of the relative disadvantages of frontage or depth in commanding the lecturer has thought the greatest difficulty is for one officer to cover a considerable extent of frontage, and in order to avoid this he seems, I venture to think, to have erred by giving each commander such a great extent of depth that practically I question if he would be able to exercise any weight whatever upon what is the most important part of a commander's duty, in the commencement, at any rate, of an attack, and that is, keeping in the true direction the force which he is commanding. It seems to me, if you split a brigade up into a lot of half-company commands, and turn those half-companies on to find their own way to the enemy, you will get confusion and overlapping long before you reach to handigrips with the enemy, and that I think is an essential objection to the proposal that has been made to us. Also, I think he has rather justified his proposal by straining the Drill Book. In his lecture he referred to two pages of the Drill Book, and said that one of them referred to "one, two, and three *bodies*;" and another to the "first, second, and third *line*." I believe, speaking from recollection, when the Drill Book said "bodies" it was dealing with troops under the command of the General before deployment, and when it spoke of "line" it dealt with those same "bodies" after deployment, and therefore there is not that divergence of opinion which Colonel Sawyer claims. I think the Drill Book gives a better system than that proposed by the lecturer, viz., that if you are going to attack you must have some separate commands in depth, that you cannot put all your eggs into one basket, and you should not irretrievably commit any portion of your force as a first, second, and third line to attack any given place. During the duration of an action there must be changes. It has been well said by Colonel Dooner, there may be a flank attack of cavalry or the development of an attack on the flank. It therefore seems to me absolutely necessary that a considerable portion of the force should at first be under the hand of the General, under separate command from that which commences the attack. No brigadier would like to commit all his force to a form of attack which necessarily from the beginning left him nothing but weak detachments for his second and third lines. I cannot, moreover, say that I agree with the lecturer that we ought to contemplate that our infantry attack would be designedly undertaken without being prepared by artillery fire, for even if the infantry of the defence lie down and refuse to disclose themselves as he suggests, I apprehend the men who are attacking will not develop their attack until they know where the enemy is, and therefore the time, sooner or later, must come when the enemy, having shown their strength, would be able to be pounded by the artillery. One minor point raised is the question of carrying arms loaded. I have always held very strongly that every military rifle ought to have some sort of half-cock or safety catch on it, but few senior officers seem to agree with me. I might mention in this matter a personal experience that occurred to me when, for the want of a half-cock in the Martini-Henry, I am satisfied in my own mind that a small war was prolonged certainly from six weeks to two months. It was in the year 1878. I was engaged in some bush operations with a detachment of the 24th Regiment. One day in the bush there were some natives opposing us; the men were perhaps a little inclined to fire quickly, and they had the misfortune to shoot one of their own officers and one of their comrades by accidental discharges. They one and all apparently agreed it was dangerous to carry arms loaded, and the next day, when we were on a nek at the side of the bush, which was being searched by other troops for the king who was within it, he suddenly rode out and galloped through us. I called out, "That is the man, shoot him," but there was not a single man loaded, so no one fired in time. He rode through the line, and rode away, and it was several weeks before we caught him. That happened because the men, having had an accident before, were afraid to carry loaded arms. I believe most fully that if you carry rifles loaded which have no half-cock and no means of securing them at full-cock you will have so many accidents that, even if you adopted it as recommended by the lecturer, you would very soon have to give it up. Although I disagree on some points with the lecturer, I must say I think we are very much indebted to him for his lecture. It has been well thought out, and bears evidence of close study of the Drill Book, and nobody can pay attention to the lecture without finding that there are a good many points in the Drill Book which he

would like to look up. The lecture is also well illustrated, and I am sure that no infantry officer, and I know I can speak for myself, could listen to or read the lecture without feeling that there is much material of value and much food for thought, and, although there is a good deal that one might not entirely agree with, there is very much to be learned from it. I think, therefore, we are all very much indebted to Colonel Sawyer for his lecture.

Colonel SAWYER: I thank you very much indeed. There are one or two points I should like to mention in reply. Of course, I was rather at a disadvantage in having to curtail this lecture so as to bring it within the time allowed. In the Journal of the Institution in India I have dealt with the subject more fully, and I think in what I said there some of the remarks I have made to-day have been more clearly brought out. It has been said that the brigadier is practically forced to take up *this* position. That is not my intention at all. I simply mention this as a maximum as to the 400 or 800 yds. If he has four battalions he can keep one in reserve, use up three, or keep two in reserve. Then, as regards the cavalry attack, as an infantry officer I can only say that nothing would give me greater pleasure—if I may use that word—on service than to meet a brigade of cavalry with one company in that formation on fair ground, viz., 800 or 900 yds. of fair ground in front. Ordinarily I do not think you would get cavalry on your flank until the time had arrived in medium distances, when those troops would be in fairly solid formation, closed up; but, any way, the formation in groups, as our drill books give it us, is one of the best ways to meet cavalry, as in the case of rallying squares, each one with a commander. As regards artillery fire I do not for a moment intend to mean that the artillery attack would cease if targets were offered. Of course, if the defence exposed their position preparatory to the attack it would be another matter, but viewed from the side of the defence what I meant to convey was that as they want to keep their mowing effect until the last, until it will take effect most, that is at 800 or 900 yds., it is probable that the decisive line of defence which is going to be taken up will not be exposed to the artillery, until the advancing infantry masks its own artillery fire. However, that is a matter entirely for the future. We have only to see what cordite and good masking guns and the proper tactical handling of men will do. If I had my battalion in position I should certainly not waste a round of ammunition on the enemy, if the position was at all favourable, until they came to about 700 or 800 yds.; and, having done so, I consider that, under the cover of shelter-trenches and anything suitable for the occasion, I should not have exposed myself to artillery attack. Colonel Dooner laid stress upon the officer commanding a company who was extinguished. I only used that word "extinguished" as dealing with facts and not sentiments. The company was practically extinguished. When one section after the other comes to the firing line and the fourth section has been absorbed into it the chances are there won't be 10 or 12 men, if so many, left, even if the captain himself is left. But I take the case as it probably would be when the fourth section is used up in the firing line. The company *is* extinguished for all practical purposes, and for the sake of sentiment to retain the command, or unit, or to recognise that such a company exists, would materially interfere with the work to be done by the companies in the rear, which will have to take up the identical battle "front." As regards advance and rear guards. Of course, these formations as in the diagram are only meant for a battle-field. In the Journal to which I have referred I went into the other question fully, and showed that this formation of section columns was adapted both for all purposes from the parade ground in review order to the assault of a position. It is one formation which specially adapts itself to everything, and especially to advance and rear guards, for taking a company as an advanced guard the first thing that is done is to divide it into section columns. With regard to the beaten zone, I have taken this straight out of Major Baker's book. I think, on reference, it will be found that the area of beaten zone is 20 yds. The figures given there were perfectly correct as regards front in depth, but I am now only referring to front. The length was given as 500 yds. in the book, but with the present cordite and I think with the higher muzzle velocity we have now, 600 yds. at 1,000 yds. range is not too much to expect. This zone (diagram of the

tubular bullet trajectory), which is perhaps more interesting to us as infantry men, refers to what I have taken as what I foresee the magazine will give us. I foresee the time when our magazine rifles will have to be completely rebuilt and tubular bullets taken into our work. The figures of this diagram are simply taken out of the tables given to us in the last Journal, where it shows that this tubular bullet has at 1,000 yds. a beaten zone of 500 yds. The only way I can interpret it is if at 1,000 yds. you have a beaten zone of 500 yds., I do not think I am far wrong in saying that for the whole of the 1,500 yds. the bullet flies within 7 or 8 ft. of the ground. As regards command and the point the chairman referred to, there again I do not wish to be dictatorial as regards confining the brigadier to any work which he is wanted to do. I simply say the Drill Book confines him to 400 yds. He can use his four battalions whichever way he likes. I simply refer to this as one extreme case. He puts the four battalions one behind the other, or he puts them as in figures 7, 8, 9, 11, 13, whichever way he likes. With regard to the direction, I have specially tested that point with my regiment under fire without bullets, but with all the noise of a sham fight, and I think the control lay completely in the hands of the commanding officer. He could wheel his front line or change his front line as he pleased. The direction from right to left is to be kept by the subaltern, but the direction of the column is entirely from behind. The commanding officer has field officers at his disposal, and he can easily do that. This little company column, the battle front of which being only 50 yds., should be very easily directed even by signal from the company commander. I can only speak from what I have tried or I would not have ventured to put the matter forward. As regards loading, we have heard a very good illustration of the necessity of keeping the men always loaded. And I think the officer in command if he had given the word "unload" on entering the bush would have avoided the accident. I would certainly propose in my own regiment under circumstances of that kind that the unit commander should be held responsible, and that at the word of command the men should always unload when necessity requires.

OCCASIONAL PAPERS.

THE MORAL ELEMENT IN STRATEGICAL SCIENCE OF THE NINETEENTH CENTURY.[1]

"The material world is too confined; if you wish to penetrate deeper into the secrets of politics and war, seek them from their spiritual aspect."—NAPOLEON I.

By R. G. BURTON, Lieut. 1st Infantry, Hyderabad Contingent.

Man is the primary instrument of war, and in comparison with him all else has but a relative importance, sometimes strengthening, and sometimes weakening the main factor.

We will regard the science of strategy from the moral point of view, and see what *rôle* is played by man (the moral agent), and what effect material means exercise.

We will see where we must seek for the key of the explanation of these two types of strategical science, the moral, and the material.

For this purpose we will pass in review the strategy of the revolutionary epoch as modified and improved upon by Napoleon I, and will also touch upon the strategy of modern massed armies.

The main point to be borne in mind in a study of this kind is the fact that man, in the moral or spiritual and not material sense, is the chief factor in war as in all other events. Napoleon I is a colossal example of this fact, and he, by his genius, achieved the highest ideal in operations of war, and created the present era of development in strategical science.

The improvements introduced by Napoleon into the strategy and tactics of the 18th century relate to the technical part of those sciences. They affect, firstly, the organization of large units; secondly, the strategy of marches.

The French divisions of 12,000 men were composed of four half-brigades of infantry, about 2,500 men in each; two regiments of cavalry and 12 guns, 6 of these latter belonging to the horse artillery.

The great defect in the strategy of the revolutionary epoch was want of cohesion, especially on the field of battle; there was too much independence attached to commands, and this naturally acted greatly to the detriment of co-operation and organization.

Besides the scattering of cavalry among the infantry divisions, which led to the dismemberment of the mounted arm, such an organization, affording commanders of divisions all the elements which were necessary for independent action, tended to too broad an interpreta-

[1] This paper is based on a lecture delivered in 1893 by the Russian General Leyer in the Nikolaeffski Academy of the General Staff, St. Petersburg.

tion of the privilege of personal initiative on the part of those commanders, and greatly impeded the general manœuvring of armies.

Napoleon took away the cavalry from the infantry divisions, and established it at first in independent divisions, and afterwards in corps, which action considerably curtailed the independence of infantry divisions, turning them from independent bodies into dependent instruments.

Working with the same object when the continually-increasing growth of armies, in view of the difficulty of controlling them, demanded new organization, Napoleon, fearing to make his army corps too independent, gave them only the exact force of cavalry necessary for reconnaissance work; all the remainder he held under his immediate disposition.

The system of requisitioning, introduced by Carnot in place of commissariat stores, although it gave great freedom to operations, entailed a wide dispersal of troops up to the very eve of battle, and even on the field itself.

In order to remove this great defect, Napoleon, in addition to requisitions, introduced a system of stores and movable commissariat into his armies. Owing to this, it became possible for troops moving separately to concentrate for battle within a small area, or, in other words, he was able to take the control of his forces into his own hands on the field of battle. In this manner, while preserving all the advantages of the strategy of the revolutionary epoch, the measures instituted by Napoleon led to the concentration of troops in a small area on the field of battle (100,000—200,000 men in a space of three or four miles), which admitted of their complete organization and control in action.

This is what was attained by Napoleon in removing the evident defects in the strategy and tactics of the end of the 18th century; in reality he only introduced corrections in the changes made in those sciences by the French revolution—by Carnot.

But these corrections were so material that they gave a decisive importance to the revolution in strategy which took place at the end of the last century; in short they, by creating an ideal of strategy, initiated a new era in the development of strategical science, so that it may be said that the true creator of modern strategy was Napoleon I.

The strategy of the 18th century presents only a stepping stone to the modern science. Frederic the Great, who was poor in resources for waging war, was nevertheless, by perfection in tactics, enabled to escape from many dilemmas, and to find a considerable arena for his genius in the creative part of strategy.

Napoleon I, rich in resources for waging war, by means of the revolution effected by him in the technical part of strategy, created for himself an arena of vast extent where his genius could appear in its full power, and could give to strategical operations a decisive character such as they had not hitherto enjoyed.

The unusually broad adaptation of the principle of action—swiftness—gives to his offensive operations the character of volcanic

eruptions; hostile armies appear as his constant aim; his lines of operation work for no more nor less than the capture or destruction of whole armies. In his hands, the great resource of strategy—battle—leads to its natural end, consummates its object on the field of battle by the last decisive attack of all its combined forces, and pursues to the furthest limit. In short, in the hands of Napoleon I, battle receives a decisive character, and, as he himself expressed it, whole empires lie between a battle lost or won.

Owing to this, war in the hands of Napoleon had such a decisive character that, in the course of a few weeks, whole empires were crushed, and their smoking ruins bore evidence to the genius of the destroyer. Such was the creative genius of Napoleon in strategy, a genius which has never been equalled, and will probably never be surpassed.

In the Franco-German war Sedan alone approaches Ulm and Marengo; all else pales before them.

All the measures undertaken by Napoleon for facilitating the exercise of control over armies in battle, measures which were strictly technical, would, however, have led to nothing if his marshals had not been equal to the new demands of circumstances, the new conditions of numerical strength and space under which armies had to be directed on the field of battle. This obliges me to turn to an analysis of the question of the importance of the general control of armies in action, and of the means of directing them, having a view to their composition and strength and the space they occupy.

The control of armies on the field of battle is the most essential and central question in strategy and tactics, because, where control is possible, order and unity of action are ensured; without control there can be nothing but disorder and chaos.

The ability to control armies in the field is dependent on their composition, their numerical strength, and, therefore, the space occupied by them.

In small armies of 40,000 to 50,000 men, occupying open areas, and disposed in almost close battle array, as in the time of Frederic the Great, the control of the army in the field beginning with the fundamental idea up to the last details, the choice of means for the attainment of the desired object; all this fell to the lot of the Commander-in-Chief alone. He observed, thought, and worked for all. All the remainder of the army, beginning with the highest ranks, merely obeyed his command and watched the fulfilment of it by their troops—in fact took only an automatic part in the control of the army. Armies on the field of battle moved by command, which was fulfilled by all simultaneously.

Under Napoleon the strength of armies increased, and the space occupied by them in the field increased correspondingly; the immediate personal control of the army on the field of battle by the Commander-in-Chief, as in the time of Frederic, became no longer possible, and the work which had been performed by him alone gave place to the collective labour of the chief and his lieutenants, the commanders of army corps and divisions; the work of the former was limited to

the making of dispositions regarding the object in view, whilst the choice of means for the attainment of that object was left to the initiative of the commanders of the larger units.

The hitherto entirely comfortable position of these latter commanders, who could march indifferently from one field of battle to another, became somewhat more difficult. They had now to look on circumstances with a regard to their requirements, and had to decide, independently and at their peril, the question of the choice of means for the attainment of the desired object. In short, some mental work and a considerable amount of moral courage were now required of them, mental attributes of the highest order compared with those qualities of physical courage which were sufficient under former conditions of the numerical strength of armies, and the space occupied by them.

This is how the question of the control of armies in the field was decided in the time of Napoleon, in the *tactics of disposition* which took the place of the *tactics of command* of Frederic the Great.

From what has been said it is evident that the problem presented to himself by Napoleon, viz., how to secure the preservation of all the advantages afforded by the strategy of the revolutionary epoch, and effect at the same time the removal of existent disadvantages on the field of battle by reorganization as regarded the control of the army, was decided only partly by his above-mentioned corrections in the organization of the larger tactical units, and changes in the matter of field commissariat. The possibility of the control of massed armies, even under these favourable conditions, was more dependent on the high moral qualities of his marshals. Whilst in the preceding epoch automatism and knowledge of the mechanical part of tactics were sufficient, skilled tactics, in the fullest meaning of the term, now became imperative, and for this skilful and able generals were required.

The Napoleonic school produced a sufficiency of generals who, as the great captain himself expressed it, "were able to wage war on great roads and within the sphere of the cannon's fire."

Such was the state of affairs until the ever-increasing growth of armies in 1812—13 required the occupation of a larger space, and presented, as regards control, more difficulties, to cope with which still greater delegation of responsibility became necessary, until the Commander-in-Chief retained only the conception of the general idea of the operation, and commanders of divisions received still wider powers of initiative, which gave them not only the disposition of the choice of means for the attainment of the required end, but also, in many cases, an independent conception of other objects emanating from the main object.

This demanded from commanders still greater inventive power, capacity for great events, strategy, and moral courage, not limited by the undertaking at their peril of the most energetic decisions required by the demands of the fundamental idea; in fact, the conditions of numerical force and space, which changed in 1813, demanded leaders of a higher order—strategists able to understand in

its entirety the fundamental idea of an operation, and the conditions applicable to any theatre of war at any moment, able not only to fulfil superior commands, but fit also for independent action.

None the less was demanded of them a high development of those qualities which are so seldom met with—moral courage, the power of unhesitatingly arriving at the most energetic decisions without waiting for orders, and sometimes even contrary to orders, should the latter not be suitable to varying circumstances. "There is nothing more difficult and nothing more important," said Napoleon, "than decision."

Napoleon had no such generals; the Napoleonic school, which allowed but limited independence, could not produce them, for Napoleon could not brook much independence of action in his inferiors, and if he had a few such generals they were not forthcoming in 1813. Ney and Oudinot commanded independent armies, and they were far from equal to their new and high positions.

In this may be sought the primary cause of the downfall of Napoleon; the enormous armies raised by him could not be controlled by one man on the field of battle, and his marshals, however excellent may have been their qualities as leaders on the field, acting some 2,000 or 3,000 yards from their chief, under his immediate command, were not equal to the demands required of them as independent leaders and strategists. Thus Ney at Bautzen, at a distance of 10 miles, and again at Quatre Bras.

They did not know how to adapt themselves to circumstances and how to take the initiative. Without following this question too far, we will dwell for a short time on Ney's action as a strategist, and on his mistakes at Bautzen and Quatre Bras.

All his mistakes must be ascribed to want of moral courage, for he was gifted with physical courage of the highest order, and it was not in vain that the whole French Army called him "the bravest of the brave."

At Bautzen he fulfilled the letter, but not the spirit, of Napoleon's commands; he was wanting in moral courage, and his understanding led him to an incorrect decision. In general, his actions at Bautzen point to a mistaken estimate of the requirements of circumstances, and want of adaptation of his decisions to those requirements.

At Quatre Bras Ney acted with great indolence the whole of the 15th June and the morning of the 16th, when he might easily have occupied that important position.

At 3 o'clock on the afternoon of the 16th, when circumstances had changed and Quatre Bras was already occupied in force by the enemy, Ney commenced those fierce attacks which were prolonged until evening, and which were entirely unsuited to the turn which events had taken; but his greatest error was ordering d'Erlon to turn from Ligny to Quatre Bras. Such was Ney as the leader of an independent force and as a strategist.

Giving his due to Ney as a tactician, Jomini says: "If in strategy he did not, perhaps, command the initiative in those broad combinations which prepare and ensure success, he nevertheless gave sound

judgment on strategical questions when they were put to him logically." This expression of one who was chief of Ney's staff in eight campaigns confirms our opinion of Marshal Ney's strategy.

The massed armies of the latter years of the Napoleonic epoch were abnormal in their time, and more suited to the present day, when such armies have railways to carry and feed them.

Now these enormous armies are quite normal, and indeed they greatly exceed those of Napoleon's time.

This increase presents one very great advantage: it admits of the pursuit of bolder aims and broader problems under conditions more favourable to the chances of their success. Beyond this it presents only disadvantages—the difficulty of supplying the massed armies, although this is in part obviated by railroads; the impediment to mobility; and, chief of all, the difficulty of control on the field of battle, a difficulty only partly surmounted by the organization of the forces.

Now the difficulties arising from numerical force and space are presented in gigantic proportions. What means will serve to overcome these difficulties as regards the control of the army in the field?

The reply is simple, although it is difficult to find the means required. The conditions of modern warfare with vast armies require a further delegation of the power of the Commander-in-Chief; to him alone will belong the task of framing the fundamental idea of an operation; his generals must act up to that idea, and independently make their decisions in accordance with it. Here, then, we come to the gist of the matter—modern conditions of war require inventive genius on the part not only of the commander but of his lieutenants; they must be strategists, and not only strategists, but tacticians. That is the only solution of the question of the means of controlling armies under the present conditions of numerical strength and space.

Railroads can greatly help massed armies in preparatory and complementary operations, but in great operations the power of *invention*, strategy, and decision are absolutely necessary in the senior commanders, the principal holders and expounders of the moral initiative to which three-quarters of the success of war belongs, for in war the moral is to the physical force as three parts to one.

We frequently hear it said that the increase in the strength of armies has already exceeded reasonable limits, and it has been asked if these giant armies are not absurd.

The reply to this, like the reply to every other practical question, may be conditional. If the manœuvring of these immense masses on the field of battle be possible, then the proper control of the fight and unity of action are also possible. Under these conditions such armies appear as a necessary institution, although a very burdensome one for the State.

If their manœuvring on the field of battle be impossible, so also is the proper control of the fight, and chaos alone is possible, which will increase proportionately to the size of the army.

And so it is evident beyond question that what is above all things

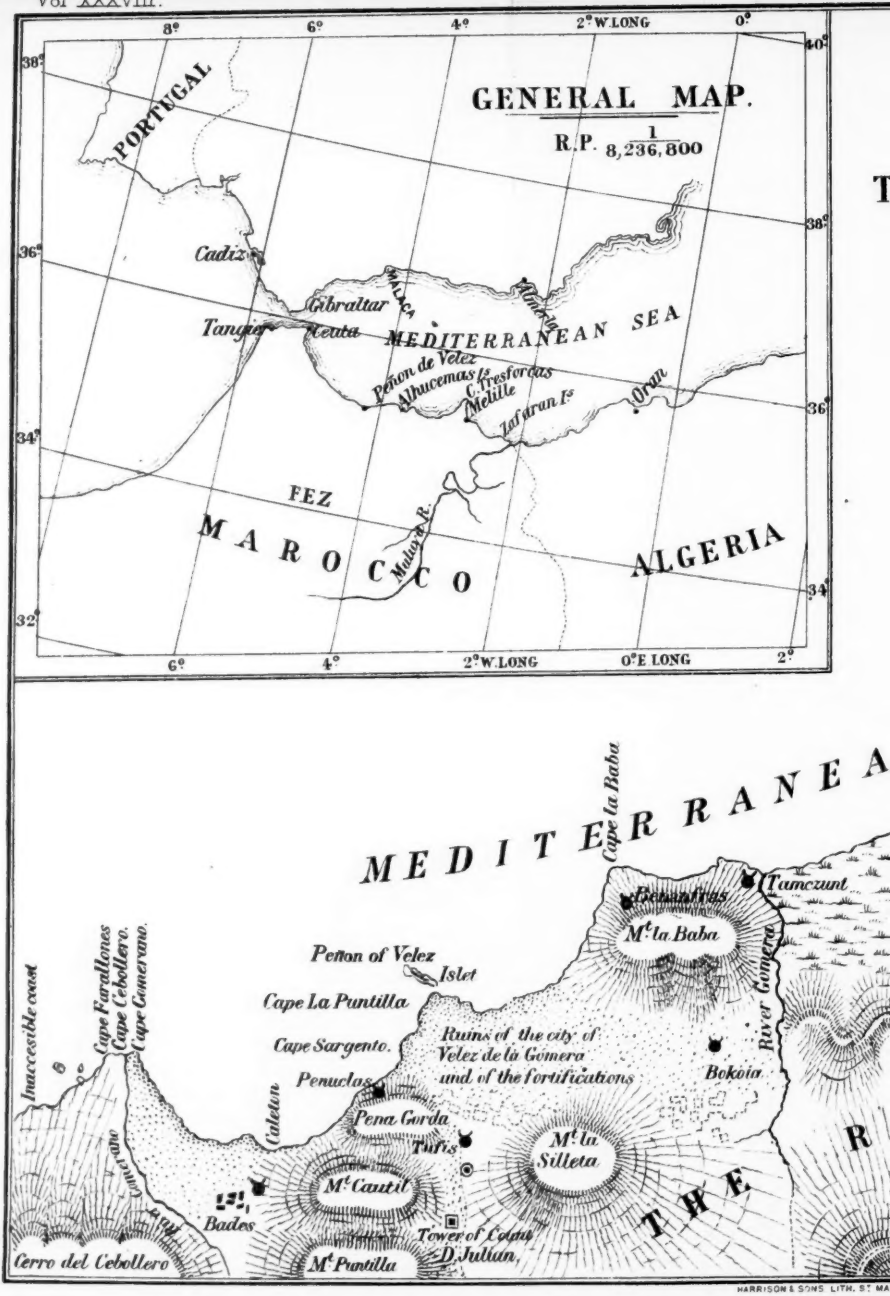
required in modern warfare with immense massed armies is the highest development of skill in the commanders of various units.

The evolutions in strategical science which we have reviewed spring from man and return to him. In life, in science, all is transient save the moral and spiritual nature of man. On this intransient nature of man the theory of science must be built; then, and then only, will that theory stand on a firm foundation.

Man always was and always will be the principal weapon in war. This is a great truth, but at the same time so elementary and intelligible in itself that it requires no long explanation.

How are we to explain the fact that such a simple truth, so easily grasped by the understanding, and so uninterruptedly repeated in life itself, does not occur to the mind when it is most required? By this only, that it has not entered sufficiently into the understanding of the majority, who grasp it only in its external aspect.

Only a deep study of military history can save us from misunderstanding, and inspire in us a respect for principles—for those fundamental truths which, as Frederic the Great said, give life to science. Without them science is but a corpse.



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Nº1

THE SPANISH POSSESSIONS OF VELEZ & ALHUCEMAS.

SCALE $\frac{1}{400.000}$ or 1" = 6·3 Miles.

= Kabyles or Tribes.

From the Memorial de Artilleria Feb. 94

S. MARTINS LANE W.C.

THE ROCK FORTRESSES OF VELEZ DE LA GOMERA AND ALHUCEMAS.

By Lieut.-Colonel J. C. Dalton, R.A.

The campaign which Spain has recently brought to a termination in the Riff country, near her settlement at Melilla on the north coast of Africa, has drawn attention more markedly to the possessions of Spain along this coast, and the following sketch of two of the least well known of these settlements or fortified points may not be uninteresting. More especially at the present moment, when, owing to the death of the Sultan, the Marocco question has been brought into still greater prominence.

The original from which this is taken is an article by D. Francisco J. de Moya, of the Spanish Artillery, and appeared in the February number of the "Memorial de Artilleria" for this year. The author treats his subject from a geographical, an historical, and a military point of view, describing briefly the military conditions of the places and their strategical position, and being himself fully convinced of their value to Spain, he patriotically impresses on his countrymen the necessity for preserving these strategical points, and if necessary for further extending the Spanish sphere of influence in their vicinity.

One cannot help being impressed by the smallness of these fortified rocks, and must wonder how so many buildings and batteries, as are described, can be squeezed into such very limited space.

The article is illustrated by three maps, one to show the positions of the islands of Velez and Alhucemas with regard to the neighbouring African Coast, and the second to show separate plans of these two places on a larger scale.

To these I have added a small inset map, which shows moreover the positions of the two places with regard to Gibraltar and other points on the Spanish and African coasts.

The *Peñon* (or rock) *of Velez* is a rocky and precipitous limestone island, some 300 ft. high, lying just off *Cape de la Puntilla* on the northern coast of the Riff territory of Marocco. It is opposite Malaga, and some 100 miles south of it, and occupies a naturally strong position further strengthened by fortifications, and containing a garrison which is practically confined to the narrow limits of the island. Velez was first taken for Spain by D. Pedro Navarro on June 23, 1508, and formed a valuable addition to the important territory which Spain had already at that date acquired on the African Coast.

The island is only some 400 yds. long by 120 in breadth, and with a population (including the garrison) of 400. It acts as an outpost of the Spanish possessions in Africa, which, according to the author, should be further supplemented by the neighbouring heights of *Baba*

el Cautil and *Gomerano*, whence the Riffians have been able to fire into the houses on the island.

Absolutely without any resources, it has suffered some terrible experiences from hunger, thirst, sieges, and plagues. Its greatest want is water, there being no such thing as a spring on the island. There are six fine tanks which collect the rain water during the rains which generally come when the wind is south-east. There is, in addition, a separate tank for the water which is brought from Malaga in tank-ships. The sole industry of the place is fishing, the fish chiefly obtained being the pollack, ruffle, chub, bream, and cod; other provisions are brought in by the natives if they choose to, and are regularly supplied from Spain.

The Kabyles (or tribes) which occupy the adjacent mainland are not so fierce as those of *Melilla*, and hence the inhabitants do not exist under such critical conditions as their geographical situation condemns them to. The nearest tribes are those of *Benanfrás*, *Tufis*, and *Bokoia*, which occupy all the coast within sight of the island.

The Peñon of Velez is a shapeless rock, on the east part of which, opposite the *Puntilla*, there is the islet of *San Antonio*, joined to the Peñon by a reef which, with very little artificial aid, forms a natural and safe bridge. On this islet, which is separated from the coast by a shallow channel only some 90 yds. wide at its narrowest part, there is an irregular-shaped fortification, of which the southern face is defended by the battery of *Santa Orosia*, the northern face being a long curtain. This work encloses the covered way and bridge which unites the islet with the Peñon.

The town is in the form of an amphitheatre, and consists of two streets only, with an irregular mass of houses.

Close to the island and on the splendid plain, the great extent of which is in full view for some distance on the mainland, are to be traced still, covered with the vegetation and accumulation of centuries, the ruins of the once wealthy city of Velez.

The Spanish occupation of the Peñon of Velez suffered a lamentable interregnum, viz., from 1508 to 1522, and after only 14 years' occupation it was abandoned in the latter year to become a stronghold of pirates, whose rapaciousness and audacity assumed such alarming proportions that their Corsairs actually sacked the Port of Valencia in Spain under Cara Mustafa, defeating the Duke of Medinaceli, who was in command of the expedition despatched against them. It therefore became evident that this piratical gang must be wiped out, and accordingly, in 1564, Philip II despatched General Don Garcia of Toledo at the head of a fine fleet of 100 galleys from Spain, Malta, and Tuscany, which left Malaga on August 29th, and disembarked on September 1st at *Cape Gomerano* a force of 6,000 Spaniards, 2,000 Germans, and 1,300 Italians, which took the city by assault on September 6th, extending its conquests to the Peñon of Velez. Here D. Garcia left a force of 1,300 men to garrison the island, and returned to Malaga, where he received the title of Viceroy of Sicily.

The pirates left 200 prisoners in the hands of the Spaniards, and

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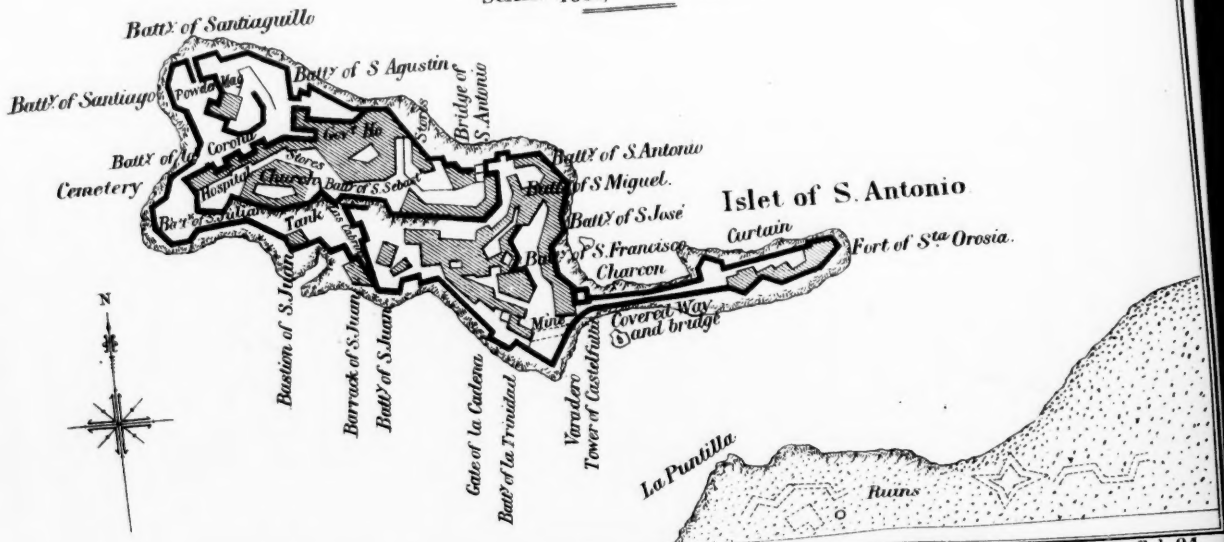
Nº 2

PEÑON OF VELEZ.

SCALE $\frac{1}{4000}$, or 1" = 111-1YARDS.



From the Memorial de Artilleria Feb. 94.

From the Memorial de Artilleria Feb. 94.

30 pieces of artillery and one year's provisions were found in the city. The memory of Velez is lost to history; the island which bears its name remains to Spain—but what of the town? It was, perhaps, lost during those tumultuous times borne witness to by the cities of Tunis, Bujia, Oran, Algiers, Tripoli, and other important conquests which once assured the greatness of Spain in Africa.

The author here remarks that in modern times some person has suggested that the Peñon of Velez should be blown up, as be considered its occupation to be useless. "Never," says the author, "should such folly be even dreamt of. One single hand's breadth of territory in Africa will always constitute for Spain a title of possession and a hope that it may spread to the Atlas which ought to form the natural southern boundary of our possessions. The command of the Peñon of Velez ought to give us that of the adjacent mainland which we had before. The Kabyles themselves will give us it some day when least expected if we know how to avail ourselves of the first act of aggression."

In proportion to the barrenness of the Peñon to which Spain is now confined is the fertility and abundance of the plain of Velez. There are yet existing amongst the ruins of the town wells containing an ample supply of drinking water, and the ancient fortifications and chief buildings of the town can still be readily recognised. The River *Gomerano*, which rises in the neighbouring mountains, flows into the Mediterranean between Capes *Farallones* and *Cebollero*, which are to the west of the Peñon.

The Peñon of Velez is in the form of a parallelogram, the longer sides of which run in a direction north-west to south-east. On the extreme south-east of the Peñon is the islet of *San Antonio*, on the north side of which is a small cove called *El Charcón*. (See Map No. 2.)

The fortification, which is very irregular, may be considered as divided into two *enceintes* defending the upper and lower portions of the rock respectively.

Commencing on the south-west coast, and entering by the *Varadero*, the gateway of which is protected by a portcullis and drawbridge, we find *El Baluarte* (the Bastion) *de la Trinidad*, which defends the entrance, and close by is the powder magazine surrounded by a strong wall, which faces the gate of *La Cadena* (the chain) close to the *Cuartelillo de Veteranos* (veterans' barracks) and the general stores of the place.

Then, as we proceed north-west, we come to the battery of *San Juan*, the barrack of *San Juan de las Carboneras*, the wall of *Las Cabrias* (the sheers), the bastion of *San Juan* below with its great tank to collect the rain water, and the battery of *San Julian* on the extreme west.

The north-west end of the island contains the cemetery, the battery of *Santiago*, and in the northern apex the battery of *Santiaguillo*, which defends the great bomb-proof powder magazine. Ascending gently to the north-east we come to the battery of *San Augustin*, the curtain of which extends to Government House.

Here commences the second *enceinte* on the highest ground, and

commanding the town completely. It contains the battery of *La Corona* which defends the hospital and victualling stores, the church of the *Concepcion* and the battery of *San Sebastian*. The guns of the Bastion of *San Miguel* command all the east coast. On the north side are the gate and drawbridge of *San Antonio*.

From this gateway the fortification descends gradually towards the first *enceinte*, and on the east end we have the battery of *San José* close to the engineer workshops, the battery of *San Francisco*, near the barrack of that name, and the tower of *Castelfullit*, which enfilades the bridge across to the islet, ending on the south with the mine or *Cueva del Charcón*. The fortification is impregnable so far as its topographical conditions will allow, but as it is commanded by the African Coast it is absolutely indispensable that its defensive works should be supplemented by an occupation of the coast as far as the old plain of Velez, and thus maintain a command over this fertile plain from Cape *Baba* to Cape *Quilates*, in order to secure the passage of the River *Nekkor*, and by this means keep an eye on *Alhucemas*.

The Wady *Nekkor*, an important river of the *Riff*, rises in the lofty range of *Uriartel*, and it and the Wady *Ris* serve to fertilize the extensive plain of Alhucemas along their course to the Mediterranean into which they flow.

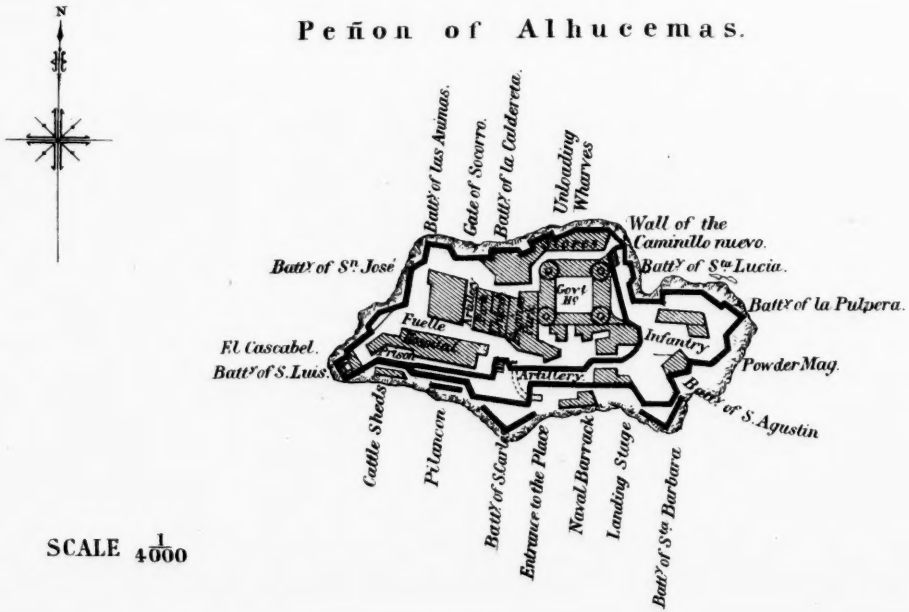
Opposite this, in the horseshoe curve between Capes *Morro* and *Quilates*, about 1,400 yards out from the shore we find the rocky island of *Alhucemas*, which is some 190 yards long by 80 wide, and about 84 feet above the sea level. There are also the islets of *Tierra* (land) and *Mar* (sea) which lie to the north-west of Alhucemas and near the coast; one of these is used as a cemetery. (See MapNo. 3.)

Alhucemas possesses the advantage over Velez that it has a fine and convenient bay, affording good anchorage at all times, but unfortunately the cliffs of the Peñon are undermined to such an extent by the sea that they could not stand any serious vibration without danger. Hence the Peñon is not armed with ordnance sufficiently heavy for its proper defence, and the fortification has to suffer in completeness for the same reason. The town of Alhucemas, like that of Velez, lies east and west, and is irregularly built. The fortification, adapted to the form of the ground, is inaccessible on the north and east, where it attains its greatest height. On the north are the batteries of *las Animas* and *Caldereta*, which in case of a siege would defend the unloading wharves, their curtains protecting the victualling stores. Further east is the *Muralla del Caminillo nuevo* (wall of the new road) which closes the fortification on the north side and extends to the battery of *Santa Lucia*, which protects the tanks. At the east end is the fort *de la Pulpera*, built on the strongest and firmest part of the rock, and next to it is the battery of *San Augustin*, which guards the infantry barrack and powder magazine. The south coast is defended by the bastions of *Santa Barbara* and *San Carlos*, strengthened by faussebrayes. Inside the ample curtain on this side is the vaulted artillery barrack, and outside is the naval barrack with landing stage and wharves.

In the extreme west is the battery of *San Luis*, and the lines con-

Nº 3.

Peñon of Alhucemas.



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From the Memorial de Artilleria Feb. 94.

necting it with the battery of *San José* enclose the north-west side of the island.

There are two gates to the *enceinte*, viz.: the *Socorro* gate to the north, and the entrance on the south, with its bridge and portcullis, outside which is a regular anchorage for vessels.

In the interior of the place there is a citadel flanked by four large cylindrical towers which serve as prisons. Inside the citadel is the parade ground and Government House. Close to this is the Watch tower, and west of the citadel is the Church and Artillery Park. The open ground near these buildings is called the *Fuelle* (bellows) and constitutes the lungs of the place, the air being compressed through a hole in the rock by the action of the waves beating into the caverns and cavities of the rock. In the south-west corner is the prison, the vaulted barrack of which is in the bastion of *San Luis*. Outside the wall of this latter is the celebrated *Cascabel*, which is a huge block of stone detached by the force of vibration from the principal nucleus.

The military history of Alhucemas is short. Since August 28th, 1673, when it was taken from the Berbers by the crews of the Spanish ships *San Augustin* and *San Carlos*, its name is not associated in the annals of war with any event of importance. It has been frequently assailed by the Riff Kabyles, but the pirates have invariably been repulsed by the defenders. It is deficient of drinking water as is Velez, possessing no springs, and life would be impossible there but for help from Spain.

As a military position Alhucemas is excellent from its vicinity to Velez and Melilla, and its possession like that of the others is necessary as a key to the African Coast. The insecurity of the soil renders it impossible to erect modern works on it, but this insecurity is of no danger to the settlement, as it is quite stable enough, when assisted by art and carefully watched, to resist the action of centuries.

The author gives as his opinion that on no account should the place be given up, for if it fell into the hands of another nation, Spain would soon learn what would result from its possession. The Spanish flag should never be lowered there until the rock itself falls.

The future to be expected from the possession of this military post is attractive for Spain. If she were, with the assistance of Alhucemas, to extend her dominions through the plain of *Nekkor* she would then join with the plain of *Velez*, which can be dominated and conquered by the fortress of Velez. Similarly if the territory round Melilla, towards the *Wadi Kert* were acquired, Spain would recover her original possession of *Zera* and *Punta Negri*, on the bay of *Azanem*, and would then have a strategical advantage over the untameable Kabyles, who are the plague of the Riff. The voyage of 60 miles which now separates Alhucemas from Melilla, owing to vessels having to round Cape *Tres Forcas*, would be reduced by one-half from *Punta de Garet*, which means two hours less for the transports.

Having thus secured the communications between the three fortified places, Spain would for the future have a powerful base for such warlike operations as might be necessary in this region and in that of *Muluya*. D. Francisco de Moya concludes his interesting paper by saying that it must never be forgotten that the possession of the rocks of Velez de la Gomera and Alhucemas are of the utmost importance to Spain, and their geographical situation is worth bearing in mind, viz., that they are nearer to *Tezza* than *Melilla*.

FOREIGN SECTION.

A STUDY OF WAR NAVIES.

By General PESTITCH,[1] of the Russian Imperial Marine.

(Translated from "Revue Maritime et Coloniale" for April, 1894, by T. J. H.)

The catastrophe to the battle-ship "Victoria" has produced a profound impression, particularly amongst naval men, by reason of the exceptional circumstances which accompanied the disaster. A modern ship has gone to the bottom, not from causes which might always occur at sea and against which no knowledge or ability could contend, but in a time of peace and fair weather more than 400 human beings have fallen victims to a fatal misunderstanding.

What increases the impression caused by this catastrophe is the fact that it was not brought about by one of those collisions of which we have had and shall still have so many examples, but by the ram of another battle-ship, the arm designed to wound an adversary has acted like a two-edged sword and inflicted on its own fleet a loss which it would have much difficulty in inflicting on that of an enemy, as we shall explain further on.

The ram made its *début* 30 years ago, during the war of secession in the battle of Hamptown, where the armoured "Merrimack" rammed and sunk three of the enemy's frigates and caused a profound panic amongst the Northerners. This prowess of the ram made a great impression in Europe, and after this sanction it acquired in all the fleets a position of honour whence neither later changes in the types of warships nor in modern naval tactics have been able to dislodge it.

Unfortunately the disaster to the "Victoria" is not the only case of suicide which can be imputed to the ram; during the last 30 years

[1] See also an article by the same author relating to the same subject, the fighting strength of warships, reproduced in the R.U.S.I. Journal for May, 1893, No. 183. We consider both these articles worthy of serious consideration, as they are the opinions of an officer of the highest rank and ability, and of the widest experience. It is, we think, more especially desirable to consider these subjects at the present time when the rage for high speed is becoming productive of a breed of maritime racehorses rather than warhorses, which, like the competitors for the Derby, are only good for running (we might almost say running away), and even for that are only good for a comparatively short spin, and at rare intervals. It is curious to see how even a cool-headed people like ourselves are liable to be carried away by this racing mania in warship construction, and such articles as those by General Pestitch form a wholesome corrective, and serve a very useful purpose in our opinion if they only cause us to pause and think that "The race is to the swift, but the battle to the strong."—The TRANSLATOR.

one might lay to the account of this dangerous arm the loss of a dozen ships carrying with them more than 2,000 men. It would seem that the time has come when this question of the ram should be examined from all sides to bring to light its real advantages, that is to say, the probabilities of its sinking the enemy, as well as its negative qualities, that is the probabilities of its sinking friends, and which, in squadron engagements of which we shall treat later, is far from being a consideration to be neglected. An example of the difficulty of ramming an adversary is found in the history of the "Merrimack" herself, for the day after her defeat of the Northern ships and in the same harbour in her encounter with the "Monitor," she made many attempts to ram her new opponent, but without success, whilst the "Monitor," avoiding her enemy, inflicted such serious injuries on the "Merrimack" by means of her artillery, that the latter was forced to give up the struggle and retreat to Norfolk. We see almost the same facts repeated at the battle of Lissa. The captains of the ships tried to ram by all the means they could think of, but all their attempts were vain, with the exception of the "Ferdinand-Max," which succeeded in sinking the "Re d'Italia," but this it is supposed was only due to the defective steering gear of the latter preventing her from in any way avoiding the blow. In the conflict between Chili and Peru the same tendency to employ the ram was evinced, but here also this engine of war was unable to demonstrate its efficiency.

The difficulties which the continual movement of two adversaries oppose to the efficient employment of the ram was also shown in the experiments which were carried out by us some years ago with steamboats specially prepared for these exercises. In spite of these ramming duels having taken place under conditions favourable to these manœuvres in time of peace, it has nevertheless happened more than once that during a whole day neither of the combatants succeeded in delivering a direct blow on the other, that is to say, one completely decisive. After we have thus taken notice, as far as possible, of the slight probability of success which the employment of the ram presents when the adversaries are in motion, and the insignificant services which this weapon has rendered in the immediate past; and after having, on the other hand, at the commencement of this article, shown what losses it has inflicted in different fleets in times of peace, let us try and present to ourselves the injuries, "the suicides" which the ram may cause in a modern squadron of fighting ships. Dozens of ships and hundreds of guns will take part in the sea fights of the future, and we must reckon on the same inevitable factors in every naval combat; thick clouds of smoke (since the navies will not have adopted smokeless powder for their heavy guns), rapid movement of the ships, causing their relative distances to vary constantly, inevitable and perfectly natural mistakes in estimating these distances. We ask, is it possible under such conditions to recognise any value whatever in all the theoretical calculations of peace time laid down for avoiding collisions, such as tables prepared beforehand, analogous processes, &c. It seems, on the contrary, that these processes, good for time of

peace, would be stricken with paralysis in the circumstances of real combat, and that the chances of collisions during the struggle would be greater than in peace-time, which would increase in the same degree the negative qualities of the ram. The adoption of this weapon was one of the first applications of that technical science to war-ships, which, continuing to develop and perfect itself, has transformed the ships of modern fleets into extremely complicated machines.

From the moment that the necessity for the existence of the ram becomes doubtful, one is involuntarily led to apply the same germ of defiance to the other technical conditions imposed on present ships. One involuntarily enquires whether all these "perfectionments" conduce to fighting efficiency? Do they effectively augment the power of the ship and does not their application detract from her true fighting strength, which should be measured by the weight of metal which she can pour into her adversary in a given interval of time? To all these points of interrogation so often raised by sailors, we can only have one reply. We must wait for a war before experience in action can establish the advantages and disadvantages of these technical innovations introduced during the last 30 years amongst all the forms of maritime attack and defence. Such a reply shows that technical science, with its incessant improvements, uncontrolled by the experience of war, is the only theoretical foundation on which actual iron-clad fleets have been constructed. What war will teach us is the secret of the future, but is there any need of the experience of battle to impress us seriously with certain anomalies which are now met with in all fleets. The cost of ammunition for guns of large calibres has been pushed to the last limit that we can go; a 110-ton gun complete with ammunition does not cost less than half a million roubles, and each shot (which in itself may not cause any serious or fatal injury to the enemy) is valued at about 20,000 (?) roubles (? 2,000).

It is clear that in this state of the question, a reaction must take place, and the artillery has now taken a recoil in the other direction. We have passed from monster calibres to more moderate ones, not as a result of experience in war, but from personal points of view, and consequently just as arbitrary as before. From this it happens that in all fleets the armament of the artillery is only a half measure and is very far from satisfying the fundamental principle which we have adopted for the fighting strength, which is valued by the number of projectiles which penetrate into the enemy's ships.

There is in this, complete analogy with the question of speed in modern ships. There was a time when 12 knots was considered sufficient to effect all the aims of a fleet, but we have done in the question of speed just as we did earlier in the question of large calibres, and we have arrived in the pursuit of steam motors to a limit which we can hardly exceed. If speed could be obtained exclusively by perfecting the engines and boilers without detracting from the other elements of the fighting strength of our fleets, there would be no room for criticism, and no reason to submit a factor to which all attach such a great importance to a critical examination. We do not see any use in contesting the views so firmly adopted on this point.

But when, on the other hand, by giving up some knots in speed, we can realize a saving in the weight of the motor, which can be put to the account of the artillery, we shall obtain a fighting force which, when we meet the enemy's ships of the same tonnage, will enable us to defeat them before they will have had time to escape.

We know, in fact, that the forced draught speed of to-day is obtained with an enormous expenditure of fuel, necessitating a large supply of coal on board. The increased speed obtained is far from being proportionate to the fuel expended, and the increased coal supply is obtained at the expense of the artillery; in addition to this, the pursuit of high speeds had brought in its train—1st, the necessity for vertical engines, which require a special arrangement of armour to protect them; 2nd, extreme delicacy and complication of the machinery for the different functions of the ship, so that it is constantly becoming deranged even in peace-time. These derangements are only trifling in appearance—they might paralyse the action of the fleet in time of war; a striking proof of this is furnished by the manœuvres of the English Fleet in 1892, when, in a period of four days out of 90 ships of all types composing the squadrons engaged, 28 were obliged to fall out and retire to neighbouring ports to make good defects.

If we think of all the sacrifices made everywhere with the view of increasing the speed, a factor, the advantages of which from a fighting point of view are still undetermined, we involuntarily ask:—1st. What is the importance of high speed from a tactical point of view? 2nd. Is equality of speed necessary for ships which have to fulfil different ends in battle? Let us endeavour to reply to these questions.

If it were demonstrated that high speed had any decided importance whatever on the issue of the combat itself, it is certain that the sacrifices enumerated above to obtain this speed would have some justification, but if we only see in this element a means of changing the position of the ships during the engagement, it becomes evident that, after the first shot, the question of high speed will be entirely a minor consideration. In reality, all the changes of position of the squadron during the manœuvres must be regulated by the movements of the slowest ships; during the fight it will also be necessary to sacrifice speed to a certain extent to assure the success of the artillery, as the accuracy of the latter will be in direct dependence on the former. Given certain conditions in which a squadron may find itself, no doubt cases may be presented in which extreme speed may play a part sufficiently important to justify the hopes placed in it. But from our point of view these cases are exceptional and do not justify the sacrifice of the very essence of the fighting strength of the fleet—the power of its artillery.

The foregoing considerations, if they are correct, prove the complete absence of a just relation between the weight of the ship's machinery and that of her artillery. Such a relation could only be obtained in a thoroughly satisfactory manner in the case where some particular means of estimating or measuring the fighting strength of

a ship exists, and which would enable us to fix exactly the value of such or such element of it. But, in the absence of this scale, we may admit, evidently without much chance of error, that the normal speed of fighting squadrons and for coast defence ships is 12 knots, allowing in some special cases that it may reach 14 knots. The last is the limit at which we should stop, seeing, as we have said already, that an ironclad fleet must be limited to slow and regular speed from the instant that it is within the range of the artillery. For the rest, if we give up a speed of 15 to 18 knots, which is useless in action, we can almost double the power of the artillery.

If we now pass to the second question. Is similar speed necessary for ships fulfilling different ends? We may remark at first that in all fleets there exists a particular category of ships for which the *rôle* of the artillery is reduced almost to zero; in this class are the scouts, torpedo-catchers, and torpedo-boats.

The necessity of carrying the speed of these vessels to the highest possible limits is so evident that the question needs no comment.

Besides these, ships of the cruiser type have recently appeared on the scene, and in estimating the importance of high speed for these we must not lose sight of the fact that ships of this type may form a part of an ironclad squadron or act independently at a distance, that is, may play the *rôle* either of aggressors or defenders, and must, in any case, have an armament powerful in proportion to their tonnage. In reality, we find that cruisers of all classes have, compared with ironclads, an excessively reduced armament, and which does not exceed $4\frac{1}{2}$ per cent. of the displacement in weight. Whatever may be the ends aimed at in the formation of a fleet of cruisers, or whatever missions may be entrusted to them, we may affirm that the successful accomplishment of these missions will depend not on the speed only, but also on the power of the artillery.

It is difficult to suppose that a cruiser in pursuit of a fixed object will only encounter on the road an adversary created expressly for her; on the contrary, it is much more probable that she will meet with one more powerful than herself; this is an hypothesis which no one will refuse to admit. It would appear, then, that the decision whether to accept or refuse the fight would depend on which of the two adversaries had the higher speed.

No doubt this reasoning would be strictly logical if it were not necessary to take into consideration the fact that with the diversity of armament carried by cruisers it will not be possible to determine the actual strength of the ship before us until the ships have arrived within range of each other and have opened fire. Under these conditions it may easily happen that the better steamer but the weaker in artillery may be beaten before she could succeed in retiring from the struggle or avoiding the unequal encounter. It follows from this that the power of the artillery of cruisers as well as battle-ships is of the highest importance, and for those equally the relation of the weight of artillery to the displacement cannot be arbitrarily modified at the expense of their fighting power, simply for a gain in speed.

Cruisers are viewed in this discussion, as in former ones, as having

to contend not only with unarmed or feebly armed merchant ships in time of war, but also, and more particularly, with other cruisers and commerce protectors.

After having brought forward as prominently as possible the importance of this factor of high speed in relation to the influence it has on the power of the artillery adopted in the different types of ships, I think it will be *apropos* to refer to the very interesting work of Captain Vitheft, published in the "Morskoï Sbornik," of March, 1872 (? 1892), which completely confirms the conclusions of the preceding considerations. This work gives a complete idea of the cost, and at what sacrifice, each additional knot in speed is obtained.

Captain Vitheft, in the course of his remarks, observes that there are no sacrifices which we are not disposed to make in order to obtain some ephemeral knots additional speed; for this we throw away millions: we sacrifice the strength of the ship and machinery, sea-going qualities, and sometimes even the safety of the crew. Further on he says that this rage for speed is excited and encouraged by the rivalry of private trade, each firm making a profitable advertisement of each knot obtained in excess of its neighbours.

The relative qualifications of actual battle-ships of all fleets have been classed by Captain Vitheft in seven tables, in which are about 120 ships, with engines of all systems giving different speeds. He has given, in addition, information on the weight and the cost of each nominal unit of power; he estimates the mean weight of each unit as 160 kilos., and its cost as about 100 roubles. In a final *résumé* the author selects for example some ships possessing a speed of over 15 knots, and gives the figures as follows:—

To increase the speed of the English ironclad "Camperdown" by $\frac{4}{10}$th knot it was necessary to increase the power of the engines by 3,140 nominal units and expend 314,000 roubles; for half knot increase in the "Victoria" (which has been lost), 4,200 units and 420,000 roubles; for a gain of $\frac{7}{10}$ knot in the "Nile," 3,400 units and 3,700 roubles; and for 1 knot in the "Sanspariel," 5,540 units at a cost of 554,000 roubles.

For the Italian ironclad "Sardinia," a gain of $1\frac{1}{2}$ knots, equal to an increase in power of 7,600 units, cost 760,000 roubles. 2 knots for the "Brandenbourg," corresponding to 5,000 units of power, were obtained at a cost of more than 500,000 roubles, and in order to gain 2 knots speed in the French ship "Magenta," the power had to be increased by 6,500 units at a cost of 650,000 roubles.

The preceding figures show the enormous sums which correspond to a comparatively slight increase in speed, but it teaches us nothing on the increase in the weights carried by the ship to attain the same end. Referring, for example, to the tables above cited, as regards the "Howe," with 10,300 tons displacement, we see that to increase her speed by 1 knot the power of her engines must be raised by 4,156 units, which in weight means an addition of about 600 tons; that is to say, about 6 per cent. of the displacement of the ship in question. By giving up this extra knot in speed and utilizing the

weight saved for the armament, we could increase the power of her artillery by nearly 70 per cent.

It is possible to bring out in still stronger relief the price at which we obtain a half-knot increase in speed if we observe that these half knots so dearly bought may easily become a fiction when the fuel is indifferent in quality, or the engineer inexperienced or negligent, &c.; in a word, from very trivial causes.

Parallel with the appearance of enormous motors and reserves of fuel, the size of the ships has grown to colossal proportions; not long ago a ship of 10,000 tons was considered a marine monster, whilst now, after only five or six years have passed, these dimensions are already insufficient, and in the designs of the English fleet, partly in construction and partly finished, there figure eight ships of 14,000 tons each; Italy possesses already five ships of from 13,500 to 15,000 tons, and it is not to be doubted that other Maritime Powers will soon follow their example.

We will not delay longer over these figures as evidences of the cost of high speed, and we have said enough to show its value from a fighting point of view; we pass over also in silence the improvements in the nautical qualities of the ships, which, in the opinion of many, are intimately connected with their increased displacement. These last considerations we are not competent to discuss, but for the rest the nautical qualities thus obtained (if this opinion is always justified) can have no importance in real action. We will seek to clear up solely the most essential points of the questions which we have raised, and enquire whether the power of the artillery is increased in proportion to the increased displacement, and at what cost is this increase obtained? To do this we will draw a comparison between two ships of different displacements and determine their relative fighting strength. Let us take, for example, the "Howe," already mentioned, of 10,300 tons and $16\frac{3}{4}$ knots, and the "Royal Sovereign," of 14,000 tons and $17\frac{1}{2}$ knots.

The armament of the first is composed of four 67-ton guns, six 6-in., and 19 quick-firing; and of the latter also of four 67-ton guns, but 10 6-in., and 25 quick-firing. These figures indicate that the armament of the "Royal Sovereign" is superior to that of the "Howe" by four 6-in. and six quick-firing guns only, and is in no way proportional to the considerable difference in the tonnage of the two ships, which is in reality nearly 40 per cent., whilst the difference in the weight of artillery carried only reaches about 1 per cent., or 100 tons in all.

The price per ton of a modern ship being about 300 roubles, we see that the 3,800 tons (which is the difference between the two ships compared), represents within a little of 1,000,000 roubles, leaving out the cost of the armour. In other words, this enormous sum, for which we could have formerly constructed a 100-gun ship, to-day represents only a simple gain of 1 per cent. in the artillery and $\frac{3}{4}$ knot in speed.

All which precedes, as well as the interesting work of Captain Vitheft, leads us involuntarily to stop and think, not only on these

striking numerical deductions, on these figures which are still eloquent even when they err by once or twice their amount, but also on all that has passed under our eyes during the last 30 years. In vain have the voices of some isolated naval men been raised in Europe, as also with us, calling attention to the abnormal state of the present ironclad fleets; these voices have found no echo, and the fleets, as if led by a fatal misunderstanding, have continued to develop in the direction once taken, cultivating only those erroneous principles which prevailed at their creation.

After having allowed myself to criticize the prevalent opinions relatively to the technical conditions required of modern ships from the fighting point of view, I cannot abstain from presenting the way in which the contemporaries of the old sailing battle-ships would have viewed this matter. It is interesting to observe on this point that the opinions of the one have been involuntarily influenced by the vast and incessant agitation and rivalries of the different building firms, whilst those of the other rested exclusively on the experience gained in the engagements of the old sailing fleets. If we then transport ourselves in thought from the present to the past, to the epoch of sailing ships, to which also the author of this present study belongs, we can assert that then also the importance of speed was not forgotten; but the speed of the ship was obtained independently of the sail area, which also had its limits, by a better form of the immersed part of the hull. Of course in calling to memory the fleets of a time long passed away, we have no intention of bringing back the days of wooden ships and cast-iron guns, but only wish to revive the old fighting principles consecrated by the experience of war, and which caused the old time sailors to regard their ship as being only a movable gun platform on which they endeavoured to accumulate the greatest possible number of guns, so as to be able to discharge, during a very short and most precious interval of time, the greatest possible number of projectiles.

We may say with all assurance that an Admiral of the old school would never have given up 10 or 20 guns (that is the tenth part of his artillery) to gain 1 or 2 knots in speed, seeing that his strength and hopes of success were placed only in his guns and the morale of his crew.

Into what a painful moral condition would the same Admiral have fallen if he had seen on the eve of the battle his fleet weakened without an engagement by 25 per cent., as happens to-day, and actually occurred not long ago, in an English squadron representing one of the best maritime forces of Europe.

In finishing this study, we express the hope that perhaps this interchange of ideas may succeed in throwing some light on certain sides of the question we have raised, and show the limits which should not be exceeded in the application of technical science to ships of war. Although we do not yet see the direction in which these questions may find their solution, we content ourselves with expressing the wish that the mist which now rests on the actual state of the fleets may be dissipated little by little, and that it

may at last be possible to formulate the bases on which we can reply to the following questions without troubling ourselves with the examples of other nations.

1st. Should we preserve the ram or prescribe its use?

2nd. Should we attempt to augment the speed of the ships at the expense of their armaments, or, on the contrary, give up some knots in speed in order to increase the power of their artillery?

TORPEDO-BOATS IN FLEET ACTIONS.

By Lieut. M. Cipriani, of the Italian Navy. Translated from the "Marittima" for May by T. J. Haddy, R.N.

The few ideas which follow refer principally to the possibility of employing torpedo-boats in a naval action, and the rules which should govern their employment in any particular case. In our opinion, the various attempts to use torpedo-boats for exploring services have always given very meagre results, and for the reason that for these services torpedo-boats are strategically and tactically altogether unsuited—in the first case because of their limited supply of coals and water, and in the second from their limited range of vision, and the difficulty of maintaining constant and prolonged vigilance in such small vessels, particularly in bad weather.

A ship can remain on the look-out easily for 10 days, and will consequently only require relief after every such period. The range of vision of a ship of the "Euridice" type is at least three times that of a torpedo-boat, and if we accord to each ship 10 days' cruising and five days for replenishing, &c., we see that she well performs the service of six torpedo-boats without ever being so reduced through the exhaustion of the crew or want of supplies as to be totally incapable of action at some distance.

This happens because the torpedo-boat is essentially a tactical and not a strategical instrument of war, and we do not think we are wrong in attributing to six torpedo-boats a tactical value very much superior to that of a ship of the "Euridice" type, whilst we would not hesitate to estimate the strategical value of a single ship of this type as in excess of that of 12 Shichau torpedo-boats. After this short digression we may return to our principal subject, remembering that due exception must be made in the case of exploring any particular harbour or port where torpedo-boats might be more rationally employed than ships.

This premised, we hold that a naval force on leaving to attack and destroy the enemy should not, except under pressure of special necessity, decide to leave the squadrons of torpedo-boats behind. Not a few questions, however, press for solution.

Under what conditions will these torpedo-boats be able to fight successfully against the enemy? What should be their tactical aim in the development of the action? Should they proceed in advance of the fleet or follow in the rear?

The favourable moment for the attack of torpedo-boats will be during the first encounter of the enemy or in the confusion which may follow the first collision of the fleets. Their tactical employment should have, above all, two objects in view: the defence of the fleet against the torpedo-boats of the enemy, and the attack against the

larger ships of the enemy's fleet. Both of these tasks will afford various opportunities. The attacking fleets may approach each other with the intention of coming at once to the *mêlée*, or to precede it by an artillery duel. In general, we may hold that it will be sufficient for one of the fleets to decide on the *mêlée* in order to make it inevitable, the other cannot avoid it without taking to flight, an inevitable manœuvre when the action must be refused, but one which puts the retreating force at a disadvantage for the artillery duel. In the consideration of the first case, in which the two fleets decide to commence the action with the artillery at a distance which may vary from 2,000 m., which is the maximum for effective fire, to 1,000, which is the minimum for efficient manœuvring, we may enquire whether torpedo-boats could be employed in this first phase of the action, or whether they must be reserved for the second. We hold decidedly for the second. Suppose that one of the fleets should send the torpedo-boats to attack the enemy; two things may happen, either the enemy will take to his heels, trusting to his artillery to repel the attack, or he will meet it by sending his own torpedo-boats against the attacking ones. In the first case he will be at a disadvantage as regards the artillery, but, on the other hand, the destruction of the attacking torpedo-boats will be certain. The attack, far from allowing the torpedo-boats to develop all their tactical advantages, will simply result in sacrificing them in order to obtain a momentary advantage for the artillery, and we must not forget that before the attacking boats can arrive within launching distance for their torpedoes they will interfere with the fire of their own ships.

Now if the retreating ships after repelling the torpedo-boats of the enemy should decide to accept battle, they will probably decide for the *mêlée* and will go into action with their own torpedo-boats intact, and these will come into contact with the enemy under the most favourable circumstances, that is, on completion of the first course, when the ships commence to turn in the opposite direction either to recommence the attack or to succour some of their own ships in distress. For us, this is the proper moment for the employment of the torpedo-boats; that is, when the ships are still enveloped in the smoke of their guns and are obliged to reduce speed in virtue of their manœuvre. It certainly appears to us in this case that the advantage of having for some time obtained an artillery gain would be grievously discounted, and the sacrifice of the torpedo-boats bitterly regretted. Whilst we hold that the retreat before an attack by torpedo-boats is the best manœuvre, we will consider what will happen when the fleet attacked meets it by means of her own torpedo-boats. In order that the attack be futile, it will be sufficient to arrest it at a distance of 500 m.; it will be sufficient therefore that the boats of the fleet attacked be launched against the enemy when at a distance of about a 1,000 m., so that while the attacking boats will be under fire during a passage of 1,400 m. up to a minimum distance of 600 m., the defending boats will be only under the fire of the enemy for 400 m., at a minimum distance of 1,600 m.: evidently the conditions are unequal, and the attacking boats will find themselves before a superior force.

Here we must note that if it is decided to meet a torpedo-boat attack by torpedo-boats, it would be a mistake to fix the moment of collision beyond a distance of 500 m., because this, far from affording additional security to the fleet, would only serve to arrest the fire of the ships at the time when it would be most effective, and making it more probable that whilst the fire of the ships is masked, some fortunate boat might escape and come safely within launching distance. It thus appears clear to our minds that when two fleets precede the decisive action by an artillery duel, the tactical employment of the torpedo-boats is illogical.

The employment of them becomes logical when the two fleets shape course resolutely and directly against each other; but should the torpedo-boat attack precede or follow the encounter of the two squadrons? Should they attempt to launch their torpedoes at that instant in which the ships are confused and the *mêlée* just established? From the construction of modern ships we cannot suppose that "line ahead" will be a possible formation in action, as the fire of the greater part of the artillery would be masked. On the contrary, each will endeavour to use his artillery as soon as he is within range; consequently, without entering into a discussion on the best formation for battle, we may allow that before the tactical collision of the fleets, it will be that which will allow to each ship the fullest possible liberty in the use of her own artillery.

Let us consider first the case in which the two fleets decide to attack, preceded by their torpedo-boats; firstly, it will be necessary to determine the distance in front of the formation at which the torpedo-boats should be kept; secondly, should the boats stop to engage each other or advance resolutely against their larger prey, it is of course sufficient if one of the squadrons of torpedo-boats has received orders to oppose the attack of the other. In the latter case, supposing the fleets have thrown their torpedo-boats forward about equal distances, it is evident that the point of collision of the boats will be the field of battle of the ships, and the fleets will come into action, passing indiscriminately friends and foes, leaving to both the task of avoiding the larger ships, as every manœuvre in immediate contact with the enemy would be dangerous. On the other hand, the fleet which, on seeing the *mêlée* with the torpedo-boats, should decide to put off for the time a decisive engagement, would permit the other fleet to interfere, and decide the *mêlée* in favour of their own side; in this case, therefore, the effect would be a general *mêlée*, the result depending on the chances of war and the superiority of the torpedo-boats and single ships. We arrive at similar conclusions if we consider the case in which the torpedo-boats pass each other and engage the larger ships. In the former case, we have endeavoured to show that the torpedo-boats once launched against the enemy cannot possibly be deserted by the ships without dooming them to certain destruction. Now, in action with equal fleets, if both adopt the same tactics, it is clear that it is impossible to foresee the result; but, in case the torpedo-boats do not precede the fleets at equal distances, the advantage will be most decidedly with those which precede the fleet

at the lesser distance, on the universal principle that division is necessary for subsistence, but union for strength. Not only will the other boats be a longer time under fire from the ships, but the ships of the fleet having the boats nearest them will arrive sooner at the field of action, and the torpedo cruisers might easily give a good account of the enemy's torpedo-boats already engaged with their own, and the latter, having their liberty of action restored by the arrival of a powerful force, would still be able to follow the fleet and contribute to final victory. Leaving the question whether the torpedo-boats should not be kept in reserve for the second line of action, it would appear that in putting them to the front it is best to keep them as close as possible to the main force, so that the latter may decide this preliminary struggle in its own favour before coming to the final tussle with the main force of the enemy. In passing on to consider the other case in which one of the fleets goes into action preceded by its torpedo-boats, whilst the other holds them in reserve, many considerations will occur to us. In the first place, we must enquire whether the fire of a squadron directed in part only, but in full daylight, against a certain number of torpedo-boats steaming against the ships at full speed would be capable of arresting the boats, considering that the latter would be under fire within a range of 2,000 m. for the short period of one minute only.

It is well, in the second place, to confront the eventuality of a fortunate discharge under the conditions most favourable to the ships, when their fire has only partially succeeded in stopping the enemy's boats, and of a lost one when the chances are in favour of the boats. Consider what an enormous tactical effect the torpedo-boats kept in reserve at the flanks of a naval force would have when employed at the instant the ships have passed each other, and what valuable assistance they could afford in protecting the re-formation, or, in the worst case, of covering the retreat; kept intact until close to the enemy, their resolute attack would equal in results that of the whole of the fleet, and the larger ships could easily undertake the risk of running the gauntlet of the enemy's torpedo-boats at full speed, seeing that they had already been badly used by the gun-fire, while their own boats would act against the enemy's ships under such favourable conditions that every discharge should be a hit. A ship passing a torpedo-boat in the opposite direction at a combined speed of 34 knots, would offer a useful target for a very few seconds only, and a very slight deviation of the torpedo, combined with the effect of the wave raised by the large ship, would suffice to render the discharge innocuous; it is sufficient if each of the torpedo-boats has received some injury, although not vital, to give a hope that they would not be able to avail themselves of the brief interval which offers for a successful discharge. On the other hand, may not the torpedo-boats in advance give a certain guarantee that the enemy's boats will be stopped? Is not the impossibility of defending yourself by the artillery at the most critical moment, when friends and foes will be grouped together, in itself a serious disadvantage? And is it not certain that in many circumstances it is better only to have the

enemy in front, than to have your powers of offence rendered feeble and hesitating from fear of hitting and destroying friends?

But, in face of all these advantages, who can estimate the disastrous effect which the fact of a ship torpedoed before arriving in immediate contact with the enemy would have on the side to which she belonged? We cannot do so, but will only remark that whilst neither this fact, nor the moment of contact of the two fleets, may decide the fate of the battle, the torpedo-boats held in reserve might well be able to do so, and only under the pressure of the severest necessity should we be disposed to dispense with them.

It is possible that a squadron possessing torpedo-boats may have to engage another fleet without them. In this case, in which we have to discuss the question of torpedo-boats against ships, it is more than ever evident that the torpedo-boat attack should follow and not precede the attack of the ships. A distinctive characteristic of the torpedo-boat is its great powers of offence at short distances, combined with very feeble powers of defence, every manœuvre under fire is fatal to them, every attack if not by surprise unfruitful, so that tactically they may be compared to cavalry on shore. The effect of a cavalry charge on troops in disorder or taken by surprise may be decisive, but it would be folly to charge infantry or artillery in good order solely to obtain a momentary confusion at an enormous sacrifice.

Torpedo-boats thrown forward by a naval force are gratuitously exposed to the enemy's fire, and placed in a position difficult for a successful use of their torpedoes. In fact, if the torpedo-boats are only a short distance in advance of the ships they can neither slacken speed nor manœuvre in any way without being overtaken by the fleet, and if they are a great distance to the front they are subjected to the destructive fire of the enemy's ships. When, however, they enter into action in the second line they have a much higher tactical value, as they are not damaged by the fire of the enemy, and are in a more favourable condition for using their torpedoes, as the speed of some of the ships at least will be reduced, and this will be doubly useful for the torpedo-boats, as they will be able to prevent the ships from re-forming promptly to meet their foes. Manœuvring ships will offer easy targets to torpedo-boats, and if they give up the attempt to re-form they may be attacked at their weakest points by the enemy whose ships are in good order; and if they should take to their heels at full speed they will probably leave some victims behind, and acknowledge that the battle is lost.

When, on the other hand, the torpedo-boats precede the ships, not only is there no guarantee that they will not all be destroyed, but their tactical opportunity, which in the preceding case may last for some tens of minutes, is limited in this to the space of a few seconds, and once launched against the enemy all control over them is lost. After the first encounter they will no longer be efficient protection for the re-formation; the fatal error of employing them prematurely will result in leaving them to wander aimlessly and disconnectedly for the remainder of the day.

The line of action proposed would appear especially reasonable for

a fleet which, accompanied by torpedo-boats, has to attack a superior force. This superiority would be felt much more directly after the encounter of the fleets when the ships have passed each other than before, or while the ships are passing. In these conditions it becomes especially important to prevent the enemy from promptly returning on the offensive, at the same time retaining the liberty to execute the same manœuvre yourself, and the most reasonable way to effect this appears to be to attack with the torpedo-boats directly the ships are clear of each other.

These are briefly our ideas on the employment of torpedo-boats in action; we may add that they may be legitimately employed to secure the retreat of a naval force, even when in this case it is necessary to sacrifice them, their sacrifice will be a reasonable one as in similar circumstances is that of cavalry on shore. In giving chase, considering the dangers to which they would be exposed, their help should be dispensed with. The employment of torpedo-boats in action will be above all conceded to the fleet which has only for a short time left its base of operations and is not at a great distance from it, and is therefore especially probable when the object of the campaign is defensive. The discussion might be extended if we wished to determine what types of ships should be opposed to torpedo-boats, but we limit ourselves at present to establishing the fact that the function of torpedo-boats is not exploration nor that of infantry scouts, to seek the first contact and the first brush with the enemy, but on the contrary to strike home, and, like cavalry, to be kept as far as possible intact until the supreme moment of onslaught, when launched on the enemy by surprise when he is already mauled by the guns, their attack may be crowned by a decisive victory.

NAVAL AND MILITARY NOTES.

NAVAL.

Home.—The following are the principal appointments which have been made:—Rear-Admiral E. Church to be Superintendent of Devonport Dockyard vice Vice-Admiral Sir R. Molyneux, K.C.B.: Captains—H. S. F. Niblett to "Northampton;" L. A. Beaumont, for service at the Admiralty; A. L. Douglas to the "Excellent;" R. H. Hamond to the "Cambridge;" C. G. Robinson to "Bonaventure" and then to "Boadicea;" and G. A. Gifford to "Bonaventure," on her arrival on the East Indian Station, and the Hon. H. Lambton as Private Secretary to First Lord of the Admiralty: Commanders—E. Simons to "Hero," A. M. Gardiner to "Raven," and R. B. Farquhar to "Havock."

The "Northampton" has been commissioned as a sea-going training and recruiting ship for boys. It is understood that instructions have been given to Captain Niblett to recruit from the seaports of the United Kingdom likely youths over 16 years and 9 months, and under 18 years of age, with a height of not less than 5 ft. 3 in. and a chest measurement of not less than 32½ in. They must be able to read and write, and be prepared to sign an agreement to serve for 12 years from the date on which they are rated ordinary seamen. They will be entered as 2nd class boys, but rated 1st class after three months' training if their conduct is satisfactory. On attaining the age of 18 years, or (if they attain that age before completing six months' training) on the completion of six months' training, they will be rated as ordinary seamen and drafted to the different depôts for general service. No special rates of pay will be granted, but the youths entered under the new conditions will receive the same pay as boys and seamen of their own rating, and they will be given the same privileges and prospects for pension as boys who join the stationary training ships under the old system. This new departure on the part of the Admiralty will be followed with great interest, and there seems to be no reason why, if the boys are carefully selected, they should not turn out as efficient and highly trained men as those entered under the old regulations.

The armoured cruiser "Impérieuse," which has lately been relieved as flag-ship in China by the "Centurion," has been paid off at Portsmouth, and is to be brought forward for further service, probably as a 1st reserve ship. As she came home at a 10-knot speed all the way, the usual paying-off steam trial was dispensed with.

The new 2nd class cruiser "Bonaventure" has been commissioned for service as flag-ship on the East Indian station; although a small vessel for such service, she has been specially fitted to accommodate an Admiral and his staff. She has had sponsons fitted for her two foremost and two after 4·7 Q.F. guns, and will probably take part in the Naval Manœuvres before leaving for her station. The 3rd class cruiser "Comus" is to be brought forward to relieve the "Ruby" in the training squadron; her armament is at last to be modernized, and she will for the future carry ten 6-in. B.L. guns in place of the four 6-in. and eight 64-prs. with which she has been armed up to the present time.

The first keel plates of the "Victorious," one of the seven new battle-ships, have been laid at Chatham, while good progress is being made at Pembroke with the

"Hannibal," whose keel was laid on the 30th of April; but beyond the preparation of material, no steps can be taken at present for the commencement of the "Prince George" and "Cæsar" at Portsmouth, and the "Illustrious" at Chatham. The other two ships, the "Mars" and "Jupiter," are being built by Messrs. Laird at Birkenhead and Messrs. Thompson at Clyde Bank respectively. The new ships are to be 390 ft. long, 75 ft. beam, and have a load draught of 27 ft. 6 in. with 900 tons of coal in the bunkers, and a displacement of 14,900 tons. It is understood the side armour will consist of 9-in. Harveyized plates, which will extend from the top of the main deck to below the water-line, an extent of some 15 ft. in depth in all, and will probably run nearly the whole length of the ship, either outside or, as is being done in the "Majestic" and "Magnificent," by carrying the curved athwartship bulkheads, which shut in the central citadel, so far forward and aft as to reduce the unarmoured ends to insignificance. Even if the belt is not carried right round, it is to be hoped that the plates round the water-line of the unarmoured parts will be made sufficiently strong to prevent a repetition of such a *fiasco* as occurred last year in Malta, when a torpedo-boat struck the "Nile" on her unarmoured water-line forward, inflicting so much damage that the ship had to be docked. The armament will consist of four of the new 12-in. wire guns, mounted in pairs in barbettes, which will be armoured with 14-in. Harveyized plates, the guns being further protected by hoods for the security of the men, such as have been fitted in the "Centurion" and "Barfleur." The secondary battery will be composed of 12 6-in. Q.F. guns and 24 smaller Q.F. guns. The machinery is designed to develop 10,000 I.H.P. under natural draught, giving a speed of 16·5 knots, and under forced draught 12,000 I.H.P., which is to give a speed of 17·5 knots. The six new second-class cruisers of the improved "Talbot" type are all to be built in private yards, and the contracts have been given to the Fairfield Shipbuilding Company for the "Diana" and "Venus," to the London and Glasgow Engineering and Shipbuilding Company for the "Dido" and "Isis," and to the Naval Construction and Armament Company at Barrow for the "Doris" and "Juno."

Last month the 1st class gunboat "Speedy" and the new torpedo-destroyer "Havock" were sent to sea in company for experimental purposes; the result, we believe, has clearly shown the superiority of the water-tube boiler. The "Havock" is provided with the ordinary tubular boiler, and after three or four hours' hard steaming, the tubes became so clogged as to materially reduce the speed; in fact, the tubes have to be swept before full speed can be got up again, while the fires have to be thoroughly cleaned. The "Speedy," however, was not only able to maintain her speed, but the tubes gave no trouble whatever, and reliability seems to be absolutely secured.

The official trials of Nos. "91" and "92"—two of the new type of 1st class torpedo-boats ordered in 1892—designed and constructed by Messrs. J. I. Thornycroft and Co., have been successfully carried out. No. "91" attained a speed on the measured mile of 23·71 knots, and the mean speed realised during three hours' continuous steaming was practically the same—23·74. The trials of No. "92" took place in somewhat unfavourable weather, as there was a strong breeze blowing against the tide, but the results were eminently successful; six runs were made on the measured mile, with a resultant speed of 24·52 knots, or 1 knot above the guarantee; and during three hours' continuous steaming the mean speed maintained was 24·12 knots. All the three torpedo-boats lately built for the navy by Messrs. Thornycroft have now passed their official trials, and each in succession has beaten the record in speed for such vessels in the Navy. If the results should be compared with those attained with the French torpedo-boats lately tried, it must not be forgotten that the French boats carry only two 15-in. torpedo-tubes, while the English have three 18-in. tubes and an additional 3-pr. gun, and that most of the French do not carry more than 15 tons of coal as against the 20, and even 30, tons carried by many of our later boats.

The "Hornet," the second torpedo-boat destroyer as yet completed for the Admiralty, made on Saturday, the 9th ultimo, another successful trial trip over the

Maplins. She left her moorings off the town pier about two o'clock, and was soon going at a high speed—nearly 30 miles an hour—down the river. As regards size and general arrangement she is very similar to the "Havock," the only difference of importance being that while the latter's boilers are of the locomotive type, those of the "Hornet" are Yarrow's patent water tubes, an arrangement that is successfully adopted for withstanding forced draft, and greatly facilitates cleaning and repairs, while any injury or fouling of one or several can promptly be remedied without the boat being seriously disabled, or put out of action. These water tube boilers likewise give an advantage in speed of a knot an hour over her sister boat, the speed of the "Hornet" being 27¾ knots, and that of the "Havock" 26¼ knots. It is noteworthy, also, that the eight boilers of the "Hornet" develop with remarkable ease 4,000 horse-power, although their total weight, with water, is less by 11 tons than that of the two locomotive boilers in the "Havock." Notwithstanding that during the run a very high speed was attained, the engines making at times no fewer than 400 revolutions per minute, there was a remarkable absence of all vertical vibration. The complete length of the boat is 180 ft., and her breadth at water-line is 18 ft. 6 in. The armament consists of a 12-pounder quick-firing gun, mounted on the conning tower forward, having an all-round fire, which from its elevated position would, no doubt, be most effective; two 6-pounder quick-firing guns abaft the conning tower, one on each side, having a range from direct ahead to well aft of the beam; also one 6-pounder quick-firing gun on pedestal aft. The torpedo armament consists of a bow torpedo tube under the forward turtle deck, and two swivel torpedo tubes on a turntable aft. The vessel is steered by steam, either by steering wheel inside the conning tower forward, or by a secondary steering wheel placed on deck aft. As to coal consumption, the trials showed that torpedo-boat destroyers of the "Hornet" type can steam at a 10-knot speed on a consumption of 3½ cwt. per hour. They, therefore, have the means of running a distance of from 3,000 to 3,400 knots without requiring a fresh supply of fuel. In addition to that contained in the bunkers, an extra quantity could easily be taken in the stokeholes and on deck sufficient under exceptional conditions to enable this little vessel to steam from 4,000 to 5,000 miles.

Successful in the extreme as they have been, yet the results obtained on the trials of the "Hornet" have been completely put in the shade by the first performance of the "Daring," the subjoined account of whose preliminary trials we have taken from the columns of the "Times":—

"At some progressive trials which were carried out on the measured mile off the Maplin Sands on 23rd ult., the torpedo-boat destroyer "Daring," which has been built for Her Majesty's Government by Messrs. John I. Thornycroft and Co., of Chiswick, beat all previous records by attaining on a single mile run against the tide a speed of 29·268 knots, and on three separate mile runs a mean speed of 28·656 knots, or almost exactly 33 statute miles an hour. The trials were witnessed by several officials who were present on behalf of the Admiralty, and by a few private persons, including Sir Frederick Bramwell, who during the day revived some interesting recollections by reccunting his reminiscences of the trials, in or about 1873, of the 'Miranda,' which then did 17·5 knots, and was the fastest screw steamer in the world. The engines were in charge of Mr. George Brown. Five series, each of three runs, were made, the first and third of each series being against, and the second with, the tide. The four first series established the following *data* concerning the speed, &c., of the "Daring" at various rates of revolution:—

Series.	Mean revolutions per minute.	Mean speed per hour.	Slip per cent.
1	91	7·864 knots	9·00
2	175	14·200 „	8·60
3	237	18·342 „	12·04
4	321	23·210 „	16·70

"The fifth series, carried out when the tide had ceased to run with much force, was designed to show what the boat could do at her best speed. The mean revolutions per minute during these three runs were 387; the mean I.H.P. developed was 4,573; the extreme H.P. developed for a single run was 4,842; and the percentage of slip was 15·8. Particulars of the runs were noted by at least half-a-dozen independent observers, none of whose conclusions differed by more than two or three tenths of a second in any case from the conclusions of the builders and of the Admiralty officials, which may be thus stated:—

	Duration of run.		Speed per hour in knots.		
	Min.	Secs.			
Against tide	2	7·6	28·214	28·392	28·656
With tide	2	6·0	28·571		
Against tide	2	3·0	29·268	28·919	

"The three-bladed manganese bronze screws with which these extraordinary results were attained are 6 ft. 2 in. in diameter, and have an 8 ft. 9 in. pitch, and a blade area of 13·5 sq. ft. The contract speed for the boat during a three hours' run is 27 knots only, and the estimated H.P. required for that speed is but a little over 3,500, or only three-quarters of the *maximum* H.P. developed on Saturday. At these trials the "Daring" was within 10 or 12 tons of her full load displacement of 220 tons, and had on board 75 persons, her normal complement being no more than 45. It is worth noting that if the new battle-ships were boilered and engined in proportion to their tonnage as the "Daring" is, they would be capable of developing the following wonderful amounts of H.P.:—"Royal Sovereign," 313,700, instead of 13,300; "Renown," 268,200, instead of 12,000; "Majestic," 327,800, instead of 12,000. Nothing can, perhaps, better illustrate the enormous power resident in the small hull, measuring only 185 ft. long by 19 ft. broad, of the "Daring." Her engines are of the three-stage compound type, each set having four cylinders, 19 in., 27 in., 27 in., and 27 in. in diameter respectively. The stroke is 16 in., and the designed boiler pressure 210 lbs. During the whole of Saturday's trials steam was blowing off very freely, and no doubt was left in the minds of any on board that even the great speed attained might have been exceeded. The boilers, three in number, are of the Thornycroft improved water-tube type, and steam can be got up in them from cold water in 15 minutes. The double rudders are also of Messrs. Thornycroft's patent, and they appear to give the boat good manœuvring power, whether she be going ahead or astern. The turning diameter is about 500 ft., and observation showed that, steaming at 210 revolutions, the boat could circle ahead in 1 min. 56 secs. and astern in 2 min. 50 secs. In turning at still greater speeds the heel was very slight, and when the boat was moving at 29 knots one could, kneeling at the stern right over the counter, write legibly and without much difficulty on a paper placed on deck, so that the builders may be said to have successfully coped with the problem of reducing vibration to a *minimum*. The amount of flame from the funnels was considerable, and, at night, would have formed a visible plume of fire 12 ft. or 15 ft. in height. This is, of course, a somewhat serious drawback, though it is hard to discover how, in a vessel of the "Daring" type, it is to be avoided when the ship is moving at extreme speed. Everthing passed off without the slightest hitch, and at the conclusion of the trials the builders were warmly congratulated."

The "Halcyon," torpedo-gunboat at Devonport, has completed the natural draught eight hours' trial of her machinery. The trial was very satisfactory, there being no difficulty in complying with the conditions of the contract, that with natural draught the engines should develop 2,500 I.H.P. The mean results of the eight hours' steaming were:—Steam in boilers, 147 lbs.; vacuum, starboard, 26·4; port, 26·2 in.; revolutions, starboard, 229·3; port, 224·7; air pressure,

1·04 in.; I.H.P., 2,590; speed by log, 16·9 knots. The estimated speed was placed at from 17 to 17·5 knots. On the 6th ult., she again left Plymouth for her three hours' trial under forced draught. After working the engines at an I.H.P. of 3,500 for 25 mins., the main bearing bolts of the starboard engine gave out, and the trial was stopped. By the aid of the port engine only, the vessel steamed back to Plymouth, where the anchor trials were carried out. These trials were ordered for the purpose of testing a new capstan gear made by Messrs. Harfield and Co., of London. The anchor was dropped in 60 fathoms of water, and from the time the order was given to "weigh the anchor," the cable was run inboard at the rate of 75 ft. in a minute and 10 seconds, being 50 secs. a shackle less time than was provided for in the contract specification. An important feature in the "Halcyon's" capstan gear is a specially fitted thrust, the action of which so reduces friction as to render the use of water, as a cooling agent, unnecessary. The officials present expressed themselves as highly pleased with the gear, and the results of the tests. The "Halcyon" afterwards returned to the Hamoaze.

Messrs. Leslie, Hawthorn, and Co., the engineer contractors for the "Halcyon," have decided to remove all the main bearing bolts of the vessel's engines, and replace them by bolts of larger diameter.

The "Hazard," torpedo-gunboat has completed her four hours' natural draught trial of machinery. The trial proved very satisfactory, the contracted horse-power of 2,500 being exceeded without difficulty. The mean results were:—Steam in boilers, 125 lbs., in engine-room, 120 lbs.; vacuum, starboard, 24·6; port, 25·5 in.; revolutions, starboard, 228·9; port, 228·9; I.H.P., starboard, 1,310; port, 1,310; total, 2,620; air pressure, 1·82 in.; speed by log, 17·5 knots. The estimated speed was placed at 17 knots; so that, in this respect, the contractors have fully complied with the conditions laid down by the Admiralty. The machinery trial having been completed, circling and turning trials were also carried out, and the results recorded.

The new 1st class battle-ship "Barfleur" has been passed into the A Division of the Reserve at Chatham, and is ready for commissioning. The Admiralty have directed that the 2nd class cruisers "Bacchante" and "Euryalus" shall be removed from the effective list of the navy.

The officials at Portsmouth, Chatham, and Devonport have been instructed by the Admiralty that in vessels of the "Talbot" class no watertight exit doors are to be fitted in machinery casings or protective decks, but access to the several casings may be provided, where required, by the fitting of coaling scuttles in the main deck. This arrangement has been decided upon with a view to reduce, as far as possible, the number of apertures hitherto provided in the watertight casings and decks of modern cruisers. Should their stability admit of it, all the new cruisers of this type will have military masts with fighting tops, but these will not be fitted until after inclining experiments have been carried out.

The new joint Naval and Military Committee on Defence has been now constituted, and is to consist of the Parliamentary Under-Secretary of State for War, as President, and the following officers as members:—Naval—The Senior Naval Lord of the Admiralty, the Admiral Superintendent of Naval Reserves, the Director of Naval Ordnance, and the Director of Naval Intelligence; Military—The Adjutant-General to the Forces, the Inspector-General of Fortifications and of Royal Engineers, the Director of Artillery, and the Director of Military Intelligence. Captain Prince Louis of Battenberg, G.C.B., R.N., and Colonel R. Vetch, Deputy Inspector-General of Fortifications, have been appointed Secretaries to the Committee.

The ships at the three naval ports (excluding coast-defence ironclads, gun-vessels, sloops, torpedo-boat destroyers, and torpedo-boats) that are, so far as their material condition is concerned, ready to be specially commissioned during the forthcoming

partial mobilization of the fleet, and the ships of similar classes already in commission at home, either in the Channel, or as 1st Reserve and port guard-ships, or otherwise, are as follows:—

	Battle-ships.			Cruisers.			Total.
	1st Cl.	2nd Cl.	3rd Cl.	1st Cl.	2nd Cl.	3rd Cl.	
Portsmouth ...	1	1	3	6	6	2	19
Devonport.....	—	2	2	2	8	1	15
Medway	1	—	1	4	8	3	17
In commission .	5	7	—	5	2	1	20
	7	10	6	17	24	7	71

In addition, 7 coast-defence ironclads, 15 torpedo-gun-vessels, 2 torpedo-boat destroyers, and about 35 torpedo-boats are available. Last year the battle-ships and cruisers engaged in the manœuvres were but 43 in number, and of these only 27 were specially commissioned.

It may be added that in recent years the days for mobilization have been:—1890, July 22; 1891, July 8; 1892, July 21; and 1893, July 11.

France.—The following are the principal promotions which have been made:—To Rear-Admiral, Capitaine de Vaisseau Touchard; to Capitaine de Vaisseau, Capitaine de Frégate "Cordier." Appointments.—Rear-Admiral Chateauminois to Major-General of the Fleet at Toulon; Capitaines de Vaisseau,—Cavalié to command of Naval Division in Cochin-China; Le Borgne de Kerambosquer to 'Magenta;" Villemsens to "Requin;" Gadaud as Chief of the Staff of the 3rd Arrondissement (Lorient); Valéry to command of 5th Naval Depôt at Toulon; Bory to command of Central-ship of Reserve at Brest; Douzans to "Suchet," and Huguet to "Dupuy-de-Lôme;" Capitaines de Frégate,—Marolles to command of "Fabert;" Miniac for service at the Ministry of Marine; Krantz for service on the Staff at Toulon, and Arago to command of "Milan."

The Commission for the examination of the cadets on board the sea-going training ship "Iphigénie," with Vice-Admiral Alquier as President, will commence its sittings at Cherbourg on the 2nd July; the other members are Rear-Admiral Escande, Vice-President; and as examiners, Capitaines de Vaisseau, Dumont in tactics and handling of ships, and Bernard in field exercise; Capitaines de Frégate, Le Moine des Mares in navigation and pilotage, and Brac de Bourdonnel in gunnery; M. Triboul in naval architecture, and M. Roques engineer-in-chief in steam. The following officers have also been appointed as the committee to inquire into all inventions of interest affecting the navy or army:—Capitaine de Vaisseau Benier, M. Clauzel, engineer of the 1st class, Lieut.-Colonel de Beylié, and Chef d'Escadron Pontet. ("Le Moniteur de la Flotte.")

The following are the contemplated movements of ships during the ensuing quarter:—At Cherbourg, the gunboat "Lynx" will commission to replace the "Sagittaire" in the Indian Ocean; the "Iphigénie," seagoing training-ship for cadets, is to receive new boilers, but will remain in commission while the work is being carried out; the new torpedo-cruiser "Fleurus" will renew her trials at the end of September; the 2nd class paddle-despatch vessel "Ardent" will commission to relieve the "Héron," a similar vessel in Senegal. At Brest, the 3rd class cruiser "Coëtlogon" will commission definitely, and temporarily, join the squadron of the North (Channel); the new 1st class battle-ship "Brennus," on arrival from Lorient

at the commencement of July, will commence her trials; the new torpilleur-de-haute-mer "Lansquenet" will resume her trials as soon as ready; at Rochefort the 1st class cruiser "Roland" will commission in September to relieve the "Magon" in the Atlantic squadron; and the new torpilleurs-de-haute-mer "Sarrazin" and "Tourbillon" will also resume their trials. At Toulon, the 3rd class cruiser "Cosmao" will be placed in the reserve to receive her new Q.F. armament; the 2nd class battle-ship "Redoutable," and the 1st class battery-cruiser "Cécille," will commission for their trials as soon as ready; the 1st class battery-cruiser "Sfax" will commission to join the reserve squadron, and the new 2nd class cruiser "Suchet" is to be transferred from the reserve squadron to the active division of the Mediterranean Fleet. According to present arrangements the reserve squadron of the Mediterranean and the 1st division of the squadron of the North will be placed, as usual, *en disponibilité*, on the 1st October. The following ships will be specially commissioned with Reservists to take part in the forthcoming manœuvres: at Cherbourg,—the armoured gunboats "Flamme," "Cocyte," and "Phlégéton," the torpilleurs-de-haute-mer "Grondeur," "Grenadier" and "Zouave," and 6 torpilleurs at present in reserve; the "Fabert," commissioned for her trials, will complete her complement with Reservists at Lorient, and will return to Brest after the manœuvres; at Brest, 6 torpilleurs; at Lorient and Rochefort, 4 from each port from the reserve; at Toulon, the armoured gunboats "Achéron," "Fusée," and "Mitraille," and 8 reserve torpilleurs; and at Algiers, 2. The following ships will also complete with Reservists for instruction, but will not take part in the manœuvres: at Cherbourg,—battle-ships "Brennus" and "Turenne;" coast-defence ship "Jemmapes;" armoured cruiser "Latouche-Tréville, at present on her trials, and the 1st class cruiser "Tourville;" at Rochefort: the armoured cruisers "Charner" and "Chanzy," and the torpedo-aviso "D'Iberville." ("Le Moniteur de la Flotte.")

The 3rd class cruiser "Coëtlogon" has made yet another trial, and the result this time seems to have been much more satisfactory, as the mean speed obtained under forced draught was 20·3 knots, and 17·8 during a 12 hours' run; but the temperature in the boiler and engine rooms still seems excessive, having been 112 F. in the former and 138 F. in the latter. ("Le Moniteur de la Flotte.")

The two new torpilleurs-de-haute-mer, "Argonaute" and "Tourmente," both built at Nantes by the Chantiers de la Loire, have recently successfully undergone their trials. With their full weights on board and drawing 6 ft. 3 in. of water, the "Tourmente" attained a speed of 24·6 knots, and the "Argonaute" of 25·1 knots. The contract speed was only 23·5 knots. These boats are 141 ft. long, and with a beam of 16 ft. 4 in. displace about 117 tons. They have twin screws, triple expansion engines, and steam is supplied by two Du Temple boilers. They carry 15 tons of coal, and the armament consists of two 3-pr. Q.F. guns, and two 15-in. torpedo-tubes, one fixed in the bows and one on a turntable aft. The "Dauphin," another one of the same type, but built by the Chantiers de la Méditerranée, has also completed her trials at Cherbourg, averaging 25·2 knots. ("Le Yacht.")

The new torpedo-aviso "Cassini" was launched at Graville, near Havre, on the 5th June. Her dimensions are as follows: Length, 262 ft. 6 in.; beam, 27 ft. 4 in.; mean draught, 11 ft. 6 in., with a displacement of 943 tons. Her engines, of the compound vertical three-cylinder type, are to develop 5,000 I.H.P., and to give a speed of 21 knots. Her armament will consist of one 3·9-in., three 2·5-in. (9-pr.), and four 1·45-in. (1-pr.) Q.F. guns with three torpedo-tubes.

("Le Yacht.")

The Reservists to be called out this year are drawn from the classes of 1885—1887, and those men who last year obtained a postponement of their period of drill; they will join their several ports of call on the 9th instant, and will serve to the 5th August. ("Le Petit Var.")

In 1878 Admiral Fleuriais, of the French Navy, brought out an electric log which was tried in the "Magicienne." It may be described as a small water-mill with a wheel consisting of cross-arms tipped with cups like the anemometer of Robinson. There were two sets of four cups mounted on the ends of the same axle, and as they revolved in the water while the ship moved, a contact on the axle interrupted an electric current flowing through a wire between the ship and the log, and sounded a telephone. The note given out by the telephone was a measure of revolutions per minute of the log and the speed of the ship. At high speeds, however, the ear was not quick at recognising the note, and Admiral Fleuriais has substituted for the telephone an electric bell, which is struck every 24 revolutions of the mill-wheel or vanes. By timing the interval between two strokes of the bell the speed of the ship is obtained. The apparatus has been tried on board the "Océan" and other men-of-war, and recently adopted by the Minister of Marine.

An annexe to the French Naval budget for next year has been laid on the table of the Chamber of Deputies, and if agreed to by that body, an important modification in the French ship-building programme will be made; among other proposals the laying down of the new 1st class battle-ship "Henri Quatre," which was to have been commenced before this in a private yard, has been postponed until some time next year not yet fixed upon. Similarly, the building of the new 1st class cruiser "Jeanne d'Arc" has been postponed, and economies effected in various directions. We shall refer to this important document again, but it by no means follows that the Chamber will look with favour upon any proposals to reduce the expenditure on new ship-building; it is, however, possible that in view of the outcry of the "Jeune École" against battle-ships, and the severe criticisms passed on the "Magenta," that we shall see fresh proposals to build more cruisers, although if that is to be the programme, we do not understand why the building of the "Jeanne d'Arc" has been deferred.

Italy.—According to the last official Return, the Permanent Squadron, under the command of Vice-Admiral Racchia, whose Chief of the Staff is Captain Grillo, was constituted as follows:—

First Division.—Battle-ship "Lepanto" (flag ship).
2nd class torpedo-ram cruiser "Stromboli."
Torpedo-cruiser "Euridice."

Second Division.—Rear-Admiral Cobianchi, battle-ship "Dandolo" (flag-ship).
Torpedo-cruiser "Iride."

Attached to the squadron also are—
Torpedo-cruiser "Calatafimi."
Cistern-ship "Tevere,"

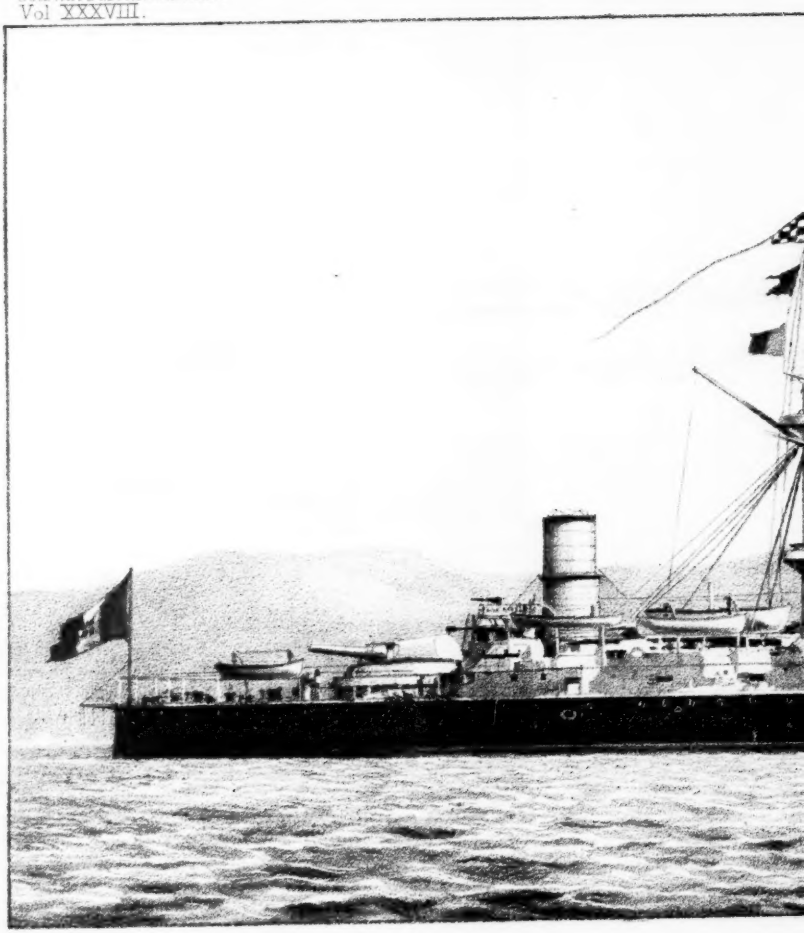
and a flotilla of 16 torpilleurs-de-haute-mer in 4 divisions of 4 boats each.

The Reserve Squadron under the command of Vice-Admiral Accinni, with Captain Amoretti, as his Chief of the Staff, is given as under:—

First Division—Battle-ships "Italia" (flag-ship), "A. Doria."
Torpedo-cruiser "Urania."
Torpedo-aviso "Saetta."

Second Division—Rear-Admiral Quigini. Battle-ships "Morosini" (flag-ship), "Duilio."
Torpedo-cruiser "Aretusa."
Spar-deck corvette "Caracciolo," attached for training purposes to the Naval Academy, and a flotilla of 16 torpilleurs-de-haute-mer in four divisions of four boats each.

There are further, in the 1st class Reserve, not attached to the Reserve Squadron, but ready for immediate commission, having their Commanders, the seconds in



NEW ITALIAN 1ST CLASS BATTLE-SHI

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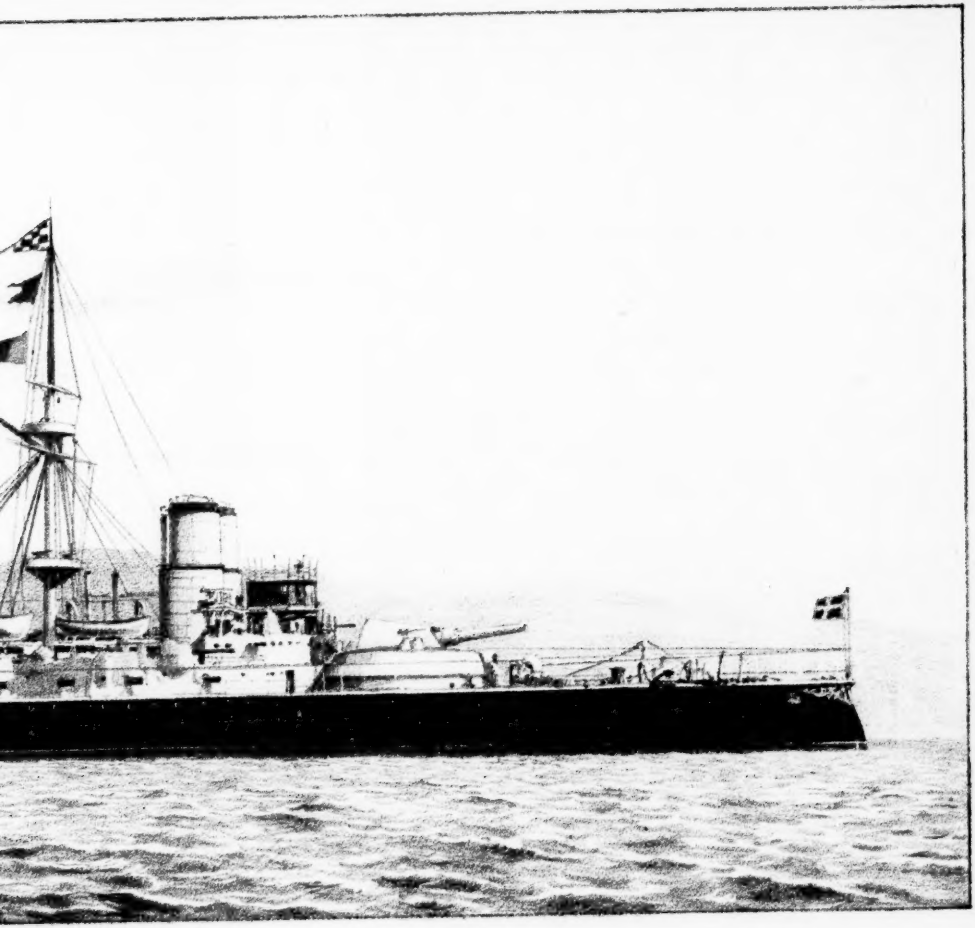

SHIP "SARDEGNA," 13,860 TONS, 22,000 I.H.P.

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command, and two-thirds of their proper complements of officers, but their full complements of men on board, the following ships:—

Battle-ships "Sardegna," "Re Umberto."
2nd class ram torpedo-cruisers "Umbria," "Etruria," and "Lombardia," and dispatch-vessels "Marco-Colonna," "Galileo," "Messagero," "Rapido," and "Vedetta."

It is reported that the new battle-ship "Sardegna" will take the place of the "Lepanto," as flag-ship of the Permanent, and the "Re-Umberto" the place of the "Italia," in the Reserve Squadrons respectively.

The official reports of the steam trials of the new battle-ship "Sardegna" (Plate 34) and the new 2nd class ram-torpedo-cruiser "Umbria" have been published. As the result proves that the "Sardegna" is faster by nearly 2 knots than any battle-ship yet constructed by any other country, it may be of interest to recall her dimensions, which are as follows:—Length, 411 ft.; beam, 76 ft. 9 in.; mean draught, 28 ft. 6 in., with a displacement of 14,210 tons; contract I.H.P. under natural draught, 15,200, and under forced draught, 22,800. Her engines were constructed at Naples, by Messrs. Hawthorn, Guppy, and Co., and are of the usual modern type. At her first preliminary trial, on the 13th April last, with a mean pressure of 105 lbs., mean revolutions 95, the ship maintained a mean speed of 19 knots, 19·8 being at one time reached; at her further official trial under natural draught on the 5th May, in calm weather, a mean pressure of 135 lbs., mean revolutions 94·8, and a mean I.H.P. of 14·150, gave for three hours a mean speed of 19·06 knots. It is permitted during natural draught trials in the Italian Navy to work the fans to assist the ventilation, but not to give any air pressure; during the trial, however, the fans were not started at all. On the 16th May the ship was run for two hours under forced draught, when a mean of 17,500 H.P. was indicated, giving a speed of 20 knots; an accident to the fan engine unfortunately brought the trial to a premature close. Further forced-draught trials were, however to be made, when the necessary repairs had been effected.[1] The "Umbria," which is a protected cruiser of the "Etruria" type, of 2,280 tons displacement, was built at Leghorn by the firm of Orlando Brothers, and made on the 23rd of last April her official natural-draught trials; the contract I.H.P. was 4,000, but 4,487 H.P. was actually indicated, which, with a mean of 123 revolutions, gave an average speed of 17·5 knots for the six hours' run; the coal consumption was 0·735 k.g. per H.P. per hour. The official forced-draught trial took place on the 21st May, and lasted three hours, with the following results:—Mean I.H.P., 7,105, being 605 H.P. over the contract; mean revolutions, 140; mean speed, 19 knots; and consumption of coal per H.P. per hour, 0·81 k.g., which was considered very satisfactory, in view of the fact that the vessel's bottom was very foul. ("Rivista Marittima.")

The torpedo-aviso "Aquila" has been employed in carrying out experiments with carrier pigeons; the birds were released at distances varying from 135 to 270 kilometres from the land, and they all returned to Spezia without any delay; the average speed of the birds was 15 kilometres in 10 minutes.
("L'Italia Militare e Marina.")

The torpedo-cruiser "Caprera" was launched at Leghorn on the 7th May, from the yard of Orlando Brothers; she is a steel-built protected vessel of the "Aretusa" type, 230 ft. long, 26 ft. 3 in. beam, mean draught 10 ft. 2 in., and a displacement

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[1] On the 26th April some experiments were carried out with the Cuniberti system of using petroleum instead of coal for the furnaces, and the Committee came to the conclusion, that with the same heating surface the petroleum developed nearly double the amount of steam produced by coal.

of 853 tons, with engines to indicate 4,800 H.P., to give a speed of 19 knots. The armament will consist of one 12-cm. (4·72-in.) Q.F. gun, six of 57 mm. (2·24 in.), and two of 37 mm. (1·45 in.) Q.F. guns, and 6 torpedo tubes.

On the 1st of May the new station gunboat "Governolo" was launched at Venice. She is a vessel 177 ft. long, 33 ft. beam, a mean draught of 14 ft., with a displacement of 1,255 tons. Her engines are intended to develop 1,000 I.H.P. with natural draught, giving a speed of from 13 to 15 knots. Her coal capacity will be 200 tons. Her armament will consist of four 4·7 Q.F. guns, four 5·7 cm. Nordenfelt Q.F. guns, two forward and two aft, two Hotchkiss 3-prs. on the bridge, and two mitrailleuses. Curiously enough, this vessel appears in all the three principal naval works of reference, viz., "Brassey's Annual," Durassier, and the "K. u. K. Almanach," as having been launched in 1891. ("Mittheilungen aus dem Gebiete des Seewesens.")

It is announced that the Minister of Marine intends to bring in force almost immediately a new regulation for the organization of the corps of seamen of the fleet, which will radically modify the existing regulations, not only as concerns the effectives of the different categories, but also their administration. It is intended to completely separate the administrative services afloat and ashore, and to suppress the present complicated and costly system which at present connects the two administrations, and absorbs a large staff; it is calculated that the change will enable the present staff to be reduced by at least a third.

Rear-Admiral Magnaghi has been appointed Military Commandant at Maddalena, and took over the duties on the 16th of June. ("Le Moniteur de la Flotte.")

The want of lieutenants and ensigns was much felt last year when the fleet was mobilized for the manœuvres, and it is not considered that the Reserve can be depended upon to supply a sufficient additional number; to meet the deficiency, 30 more cadets will be entered yearly at the Naval Academy at Leghorn, and a special course of instruction has been organized for officers of the Reserve; the number of engineer officers also at present falls much below the requirements of the navy, owing to the rapid increase of the fleet during the last 10 years; there are at present 204 engineer officers on the list. The effective list of men has been raised from 20,660 to 21,821, an increase of 1,161.

("Mittheilungen aus dem Gebiete des Seewesens.")

It is officially announced that the submarine-boat "Pullino," which was to have taken part in the coming manœuvres, will not now do so, as her speed will not permit of her keeping company with the ships of the squadrons. The "Pullino" will therefore continue to carry out experiments in the Gulf of Spezzia.

When the squadron was entering the Gulf of Spezzia, on the 13th of June, the "Terrible" torpedo-school-ship collided with and sank "No. 87" torpedo-boat; the crew were saved. "No. 87" was one of the Schickau 125 ft. torpilleurs-de-haute-mer, and was built in 1888; in addition to her two torpedo-tubes, she carried two 37-mm. Q.F. guns. ("Le Moniteur de la Flotte.")

Japan.—The Government have decided to add to their navy two powerful battle-ships, and the construction of the vessels has been confided to Sir W. Armstrong and Company, of Elswick, and the Thames Iron Shipbuilding Company, while their machinery will be made by Messrs. Humphrys, Tennant, and Company. The ships are to be of the "Royal Sovereign" type, and their principal dimensions as follows:—Length 370 ft., breadth 73 ft., draught 28 ft. 6 in., with a displacement of 12,250 tons. They are to be protected by an armour belt for 226 ft. of their length, the part covering the machinery and boilers being 18 in. thick, and before and abaft this 16 in. There will also be a 2·5-in. protective deck, extending from stem

to stern. The propelling machinery will be twin-screw engines of the three-cylinder triple expansion type, to develop 14,000 I.H.P., the steam for which will be supplied by cylindrical boilers of the ordinary marine type, adapted for working with a moderate forced draught. The vessels will be armed with four 12-in. guns in two barbettes plated with 14-in. armour, 10 6-in. Q.F. guns in casemates, and 14 3-pr. and 10 2·5-pr. Hotchkiss Q.F. guns, with six torpedo-tubes. The armour for the new ships will be supplied by Messrs. Cammel and Messrs. Vickers and Company, of Sheffield; the plates are to be all steel, and Harveyized according to the process recently adopted by the Sheffield plate makers.

Norway.—Two new torpedo-boats have recently been launched at Christiania. Formerly known as Nos. "8" and "9," they have been christened the "Varg" and the "Raket" respectively. They are 113 ft. long, with a beam of 12 ft. 2 in., and a displacement of 43 tons, and each has triple expansion engines. While, however, the one has Thornycroft water-tube boilers, made in Norway, the other has Du Temple boilers of French construction.

Russia.—The Baltic evolutionary squadron under the command of Vice-Admiral Gherken consists this year of the following ships:—

Battle-ships—"Emperor Alexander II," (flag-ship); "Peter Velikie."
1st class armoured cruiser—"Dmitri Donskoi."
Armoured coast defence ships—"Admiral Tchitchagoff."
"Admiral Lazareff."
2nd class cruisers—"Nayezdnik."
"Opritchnik."
Armoured gunboats—"Gremiashchi."
"Otvajny."

The training squadron, under the command of Rear-Admiral de Livron, is composed of the three coast defence monitors "Pervenets" (flag), "Smertch," and "Kreml."

An effort is being made to discover the wreck of the "Rusalka," which was lost last year while proceeding from Sveaborg to Kronstadt. The search expedition consists of the salvage vessel "Guiliak," having on board several officers, 100 seamen, and 66 divers, two torpedo-boats, two other small steam-vessels, and several steam-boats, the whole under the command of Rear-Admiral Wychniakoff. A balloon has also been sent for use with the party. The waters along the Baltic shores are very clear, and it is considered possible that from a small height up in the air the wreck may be distinguished as it lies on the bottom. Two Swedish vessels are also assisting in the search, and two Finnish vessels are to drag the bottom with specially constructed apparatus, while powerful electric lights have been provided by which the water to a depth of 20 ft. can be investigated. The "Grajdanine" reports that Vice-Admiral Kremer, Chief of the Staff at the Ministry of Marine, is to spend some time superintending the work.

The armament of the new battle-ship "Navarin" is now completed, and the ship will commence her trials immediately. ("Kronstadt Messenger.")

The new battle-ship "Sissoi Velikie" was launched on the 1st June from the Admiralty yard on the Neva, in the presence of the Tsar and a brilliant assemblage. Her dimensions are as follows:—Length 345 ft., beam 68 ft. 10 in., 8,880 tons displacement, and engines of 8,500 I.H.P. to give a speed of 16 knots. Her armour belt is 16 in. thick. Her secondary battery will be protected by 5-in. armour and the barbettes by 14-in., while the athwart ship bulkheads will be 5 in., and the armoured deck 3 in., thick. Her armament will consist of four 12-in. and six 6-in. Q.F. guns, 12 47-mm. (3-pr.) Q.F. and four 37-mm. Q.F. guns, with six torpedo-tubes.

Work is progressing at the Baltic Shipbuilding Yard, St. Petersburg, on the new armoured cruisers of the "Rurik" type, the "Rossia" and "Rurik" No. 3. The dimensions of the first named will be: length 480 ft., beam 68 ft. 6 in., mean draught 25 ft., and displacement 12,130 tons. The dimensions of the second will be: length 446 ft. 9 in., beam 70 ft., mean draught 27 ft., and displacement 12,095 tons. Both ships will be supplied with engines which are to develop 15,000 I.H.P., and to give a speed under natural draught of not less than 19 knots. Details as to the armour protection are not as yet forthcoming, but the armament apparently will be the same as that of the "Rurik," viz., four 8-in., 16 6-in., six 4·7-in. Q.F. guns, and 18 3-pr. and 1-pr. Q.F. guns, with six torpedo-tubes. The "Three Hierarchs," a sister-ship to the "Cissoi Velikie," has been commenced, and another of the same type is shortly to be laid down. A commencement has also been made with another coast defence vessel of the same class as the "Admiral Senjavin," of 4,120 tons. These are in addition to the three large battle-ships, the "Poltava," "Sebastopol," and "Petropavlosk," the two latter of which are to be launched very shortly, while, in accordance with present arrangements, the "Admiral Senjavin" is to be launched in the autumn. This ship was wrongly reported by the telegraphic agencies from St. Petersburg as having been launched last summer, and the report seems to have obtained general credence, as Durassier, Brassey, and the "K. u. K. Almanach" all note her as launched in 1893. There are further 18 torpilleurs-de-haute-mer under construction by M. Normand, of Havre, the Schickau firm at Elbing, and in the Neva yards, and it is stated that 10 more are to be commenced, while a contract has been entered into with Messrs. Yarrow and Co., for a torpedo-destroyer, which is to have a guaranteed speed of 30 knots. The two torpedo-boats building in the Creyton yard at Abo have been named the "Polangen" and "Dagerord;" they have a displacement of 150 tons, and are to steam 27 knots. The "Nargen" and "Gogland," building at Kolpino, with a displacement of 87 tons, are only to have a speed of 22 knots, while the three boats building at Elbing have a displacement of 130 tons, engines of 2,400 I.H.P., and will have a speed of 27 knots; they will carry three torpedo-tubes and two small Q.F. guns. ("Rivista Marittima.")

The trial trip of the "Petersburg," the third of her class built by Messrs. Hawthorn and Co., at Hebburn-on-Tyne, for the Volunteer fleet, took place recently before a Russian Commission. During a continuous run of more than 12 hours, a speed of 19 knots was maintained; the ship was launched on the 5th February last, and we gave a description of her in the March notes.

The steamer "St. Petersburg," lately belonging to the Volunteer fleet, has been taken into the navy under the name of "Beresan," and is to be used as a school-ship for the 31st Seamen's Division in the Black Sea.

The total number of cadets embarked from the Naval Academy for the summer cruise in the Baltic is 250; the 1st company are on board the steam training ship "Skobeleff," an old spar-decked corvette, the 2nd on board the new sailing training ship "Voïne," the 3rd on board the sailing corvette "Morjak," and the 4th on board the "Bajan," also an old corvette.

Spain.—The Minister of Marine has given directions that the training and evolutionary squadron is to be constituted as follows:—

Battle-ship—"Pelayo."

1st class armoured cruiser—"Infanta Maria Teresa."

1st class cruisers—"Alphonso XII," "Reina Mercedes," "Reina Regente."

2nd class cruisers—"Conde del Venadito," "Marques de la Ensenada."

Three torpilleurs-de-haute-mer will be commissioned at Port Mahon, and 14 at Carthagena. The naval Colonial forces at Cuba, Puerto-Rico, and the Philippines are to be slightly increased; but the cruisers on foreign service, the training-ships and troopers will be maintained at the same strength as last year.

("Rivista Marittima.")

United States.—In view of the charges brought against the Carnegie Steel Co. for fraud in connection with the armour-plates lately supplied to the Government, the following report shows that the charges, if there is even any truth in them, must be at least grossly exaggerated. As all these armour-plate trials are of great interest, we have no hesitation in reproducing accounts of them in the Journal.

The report is made by Lieutenant Mason, in charge of the Indian Head Proving Grounds, and gives the results of the recent test of a Carnegie plate which had been rejected by the Government inspector on account of surface cracks and other defects. The plate tested was manufactured for the barbettes of the battle-ship "Massachusetts." It is a 6-in. Harveyized curve plate, 21 ft. 8 in. long by 5 ft. 3½ in. wide. It is officially known as plate No. A-883, and is one of those which some of the informers alleged to be defective. It had five vertical cracks on the surface from 18 to 24 in. long. The plate was erected, being supported at each end by heavy timbers and bolts. Three shots were fired from a 40 calibre 6-in. gun with the following results, according to Lieutenant Mason's official report:—

Shot No. 1, fired with a velocity of 1,800 ft., and striking energy of 2,248 ft.-tons, line of fire being normal at impact, striking about 15 in. from the most serious crack, penetrated about 3·5 in. The shell broke, the ogival head welding into the plate, the remainder of the shell scattering into fragments. The effect on the cracks was to open them out a little and deepen them a very little to the softer metal of the plate, but did not lengthen any of them. No new cracks were developed. On being struck, the plate sprung like a bow, but came back in place again. The second shot struck 26 in. to the right of impact No. 1, and 6 in. from the end of cracks and midway between them. The result was about the same as from the first shot. The third shot was fired with a velocity of 2,030 ft., with a striking energy of 2,700 ft.-tons. It struck the plate at an angle of 12° with normal, and about 22 in. from second impact. The penetration was about 4 in. The shell smashed on the plate in the same manner as the two previous shots. It caused no change in the cracks.

The report concludes as follows: "The hard metal of the surface of plate showed a very fine grain, having a clear ring when struck, resembling very much tool steel, and also that of some of the points of the armour-piercing projectiles. The original cracks were not appreciably lengthened by any of the impacts, but seemed to open out a little bit and deepen somewhat. The opening out and deepening of these original cracks were very slight indeed, hardly appreciable, and the opening out may have been simply that the scale jarred away from the edges of the cracks." ("Army and Navy Journal.")

Another important test of Harveyized armour took place on Saturday, 19th May, at the Indian Head Proving Grounds. An 18-in. Harveyized plate, representing a group of armour for the sides of the battle-ship "Indiana," manufactured by the Bethlehem Iron Works, was fired at, but owing to a large interior crack developed during the tempering process did not withstand very favourably the attack made upon it.

The official report of the test, submitted by Lieutenant Mason, who had the matter in charge, has been received at the Navy Department. The length of the plate was 15 ft. 11 in., and its width 7 ft. 5 in. At the top the thickness of the plate was 18 in. and at the bottom 8 in., the entire weight of the plate being 33¼ tons. It was secured to a 36-in. oak backing by 26 3¼-in. bolts. The gun used was a 12-in. breech-loading rifle, and the distance of the plate from the muzzle of the gun was 380 ft.

A charge of 269¼ lbs. was used in the first round. It gave the 12-in. armour-piercing projectile a striking velocity of 1,465 ft.-sec., and a striking energy of 12,600 ft.-tons. The ratio of energy to that necessary to just perforate wrought iron of the same thickness was 1·06. The projectile was of normal weight and dimensions, hardened 3½ in. below bourrelet. When fired, it struck the plate normally, 83 in. from the right edge, 36 in. from the top, and 12 in. above the taper line, penetrating 19 in. from the face of the plate. It rebounded 35 ft. to the front, entire and slightly set up with three longitudinal cracks, one 7 in. long over shoulder of the ogival; another 6 in. long in the upper part of the body and ex-

tending through bourrelet, and another 11 in. long, beginning in upper part of the body, and running upward as far as the shoulder of the ogival.

The plate was cracked through from top to bottom through this impact, 7 in. wide at the top, 6 in. wide at the impact, and 2 in. wide at the bottom, and also cracked from impact to left edge; 6 in. wide at impact, ¼ in. wide at left edge. This horizontal crack showed a flaw or temper crack in the plate extending from the left edge to nearly the middle of the plate to within 1 in. of the front and rear surfaces. Portions of this flaw were discoloured by oil. In some places there was sufficient oil to be very susceptible to the touch. The upper left-hand portion of the plate was lifted several inches, forcing up the first layer of backing. No armour bolts were broken.

The charge of powder in the second round was increased to 41·3 lbs. The shot was given a striking velocity of 1,926 ft. sec., and a striking energy of 21,882 ft. tons. The ratio of energy to that just necessary to perforate wrought iron of the same thickness was 1·84. The Carpenter projectile, hardened 3 in. below the bourrelet, struck the plate normally on the right-hand fragment, consisting of about three-eighths of the original plate, 36 in. from the top, 33 in. from the right edge, 50 in. from impact No. 1, and 12 in. above the taper line. The shell penetrated to within 2 in. of the back of the plate and then broke up, leaving its point welded into the centre of the fragment of back bulge and twisting off. The rest of the ogival and the bourrelet remained about 8 in. further out, apparently just lying in the hole. Portions of the remainder of the projectile dropped in front of the plate. The plate was cracked through from impact No. 1, through this impact, to the right edge, with cracks 6½ in. wide at impact No. 1, and 5½ in. wide at the right edge. A fine crack was developed from the impact nearly to the bottom of the plate and another one running nearly to the top. There were also several fine radial cracks about the shot hole. No armour bolts were broken.

The results of this test have brought out expressions concerning the advisability of Harveyizing armour. A number of experts of the Ordnance Bureau favour the continuance of the process, but there are also a large number who think that more experiments should be made in this matter before compelling the firms having armour contracts on their hands to turn out a number of plates and have them rejected simply because the process, as applied to thick plates, was a failure. Much interest is attached to the trial of the 17-in. plate, representing a group of armour for the barbettes of the "Massachusetts." It is believed that the results of this test will aid in definitely establishing whether or not the process can be applied to thick plates with success. Assistant-Secretary McAdoo is contemplating appointing a Board to conduct extensive experiments in this matter, and such action on his part is to be commended.

If the Congressional Committee at present investigating the armour plate frauds had witnessed the test at Indian Head of a rejected 6-in. Harveyized Carnegie plate, which had already withstood three shots of 1,800 and 2,000-ft. velocities, any views its members might have regarding inferior armour turned out by this Company might have been materially changed. The plate was rejected on account of cracks and blowholes, but was given to the Government for testing purposes. The three shots which had previously been fired failed to either widen or lengthen the cracks, although their impacts were very close together and in the direct line of the cracks. A 6-in. projectile was next fired at the plate with a velocity of 2,000 ft. It struck the plate at a point near one of the former impacts, and within about 12 in. of the top of the plate. The Ordnance officials expected that the plate would be demolished, but, contrary to their expectations, it successfully resisted the shot, the latter penetrating but a few inches and then scattering into fragments.

This is the first time a plate below 10½ in. in thickness has withstood a shot fired at it with a velocity of 2,000 ft. The trial was all the more remarkable in view of the fact that the plate had already been struck by shots of velocities of 1,800 and 2,000 ft., and Ordnance experts are very much pleased with the result. Captain Sampson says that this trial shows conclusively the advantages of the Harvey process. ("Army and Navy Journal.")

A test of the Sterling projectile was held on the 5th May, at the Indian Head Proving Grounds. The test was made more interesting by the fact that the 13-in. gun was used. Two Sterling projectiles only were fired, one a 13-in. shot and the other a 12-in. They were both fired again at a 12-in. Harveyized curved plate, manufactured originally for the "Texas." The 12-in. projectile was the first one fired. It was fired at an angle of three or four degrees with normal and penetrated the plate, wood backing and 12 ft. of sand. It was recovered entire and uncracked. The upper left-hand corner of the plate, against which the impact occurred, was knocked to pieces. The 13-in. shell struck normally about 36 ins. from the first impact. Like the first shot, it penetrated the plate and backing and glancing out of the butt, falling about 350 ft. to the rear of the structure. The projectile was recovered entire and uncracked. This shot practically wrecked the plate. The striking velocity of both shots was 1,500 ft. per second.

An acceptance test of a Carpenter shell also took place on the 8th May, at the Indian Head Proving Grounds, and, like other trials of this projectile, resulted very satisfactorily. The big 13-in. gun was used and the projectile was fired against a 12-in. curved nickel-steel plate, belonging to the side armour of the "Texas." The shell was fired with a striking velocity of 1,375 f. s., and a striking energy of 14,444 ft.-tons. It pierced the plate without apparent effort, continuing through the oak backing, and was finally recovered uncracked. It was found not to have been set up at all. ("Army and Navy Journal.")

The trials of the new "Commerce-Destroyer" "Columbia" have finally concluded and the official report, which is very voluminous, has been made public. The report which obtained currency through a news agency to the effect that the ship had attained the remarkable speed of 24 knots seems to be quite incorrect, 22·8 knots appears to have been the highest mean speed recorded on her forced draught trial; during the six hours' trial under natural draught an average of 18 knots was maintained, although for two hours a spurt of 18·5 was made; a speed of 10 knots was maintained with an expenditure of 38·3 tons of coal per day, and for an expenditure of 70 tons a day a speed of 13·3 knots. These results cannot be considered anything remarkable when it is remembered that the "Columbia," with a displacement of only 7,475 tons, has engines developing 21,000 I.H.P., and that she is 412 ft. long with a beam of only 58 ft. 2 in. The "Royal Arthur," a vessel of almost identical tonnage, with engines only developing 12,000 I.H.P., on a trial run between Callao and Coquimbo, averaged 18·1 knots and spurted for three hours at 19 knots, which, as she is a wood-sheathed ship and 52 ft. shorter with 2 ft. more beam than the "Columbia," is much more of a record performance; the "Crescent," also a sister-ship, appears on her voyage to Australia to have maintained a speed of from 12·5 to 13·5 knots on a coal consumption of only 60 tons a day, which is 10 tons a day better than the "Columbia"; it will, however, doubtless be found, as is generally the case with our own ships, that the "Columbia," after she has been some time in commission, will improve her record both in speed and in the lowness of her coal consumption, and we do not suppose the last word has yet been heard about her.

MILITARY.

Notes on the Application of Chapter IV, Field Artillery Drill, 1893, to Minor Tactics.—We are indebted to Lieutenant-Colonel J. D. Douglas, R.A., for the following notes intended for the use of majors preparing for examination. It is hoped they may also be found useful to other officers called on to command mixed forces, and to junior artillery officers finding themselves, perhaps without much previous practice, commanding the artillery under them:—

"Chapter IV, Field Artillery Drill, 1893, contains in a condensed form all that is necessary for handling artillery in the field. I propose to dwell on such points only as seem to me most frequently missed in the manœuvres of small mixed forces such as we usually see at district camps in India. Forces, that is, of from

two to four battalions, with from one to four squadrons, and one or two batteries as auxiliary troops.

"The heading of the chapter is to be noted. The term 'Artillery in the Field' may be held to cover all descriptions of mobile artillery. Stress is laid on this because I have seen at field days horse artillery following cavalry about without any apparent tactical object, and mountain guns sent to the top of a hill without any more definite purpose. Both horse and mountain batteries should be employed, if attached to a brigade of infantry, exactly as field batteries would be, advantage being reaped, if possible, from the superior mobility of each special branch on its own ground.

"Sec. 1. Note that each brigade division of artillery has its ammunition column, and thus a detached battery if meant to act independently during an engagement should have a section or unit of the ammunition column within an hour's march of it.

"The composition of 'corps artillery' shows us that horse artillery is not intended exclusively for the support of cavalry. A battery from the corps artillery might very well be chosen to accompany a detached infantry brigade on some temporary duty, and if forced marches were required, probably a horse artillery battery would be selected.

"Superficial observers accustomed to see horse artillery manœuvring at a gallop are too apt to forget that deep ground and short forage reduce the marching pace of wheeled carriages terribly. Under conditions similar to those of the Crimean campaign, horse artillery would move none too fast, and field batteries far too slow for a smart infantry column.

"Secs. 2 and 3. Every para. of these sections should be studied.

"Sec. 2, para. 2. No risk should be run with a view to keeping a single battery near the head of a short column of only two battalions. If this is the whole strength of the column's main body, it is better to allow the battery to march from 20 to 100 yds. in rear of the rear battalion. The dust of artillery annoys infantry, and keeping exact pace with infantry distresses artillery horses, especially in an undulating country. Unless roads are very bad and narrow, artillery is almost as favourably placed for action when marching behind two battalions as behind one.

"Sec. 3, para. 2, should be strictly obeyed.

"Sec. 4, para. 2, is too frequently neglected by C.O.'s of batteries acting singly with other troops. The reason is probably that the artillery officer fears being accused of slowness in manœuvre. He would act differently on the practice ground, where he is sure of his action being watched by a competent critic.

"Sec. 5 should be studied in conjunction with what is known regarding the time a battery usually takes to open effective fire. It would, for instance, be useless to order a battery in column of route to get into position some 3,000 yds. from a bridge and fire on it with a view to injuring an enemy if it were obvious that the latter would be across the bridge and under cover within five minutes.

"Secs. 6, 7, 8, 9, 10, 11 call for no special remarks, except that the C.O. who has only a single battery at his disposal should never call on the officer commanding it to try and make it into a brigade division by splitting it up into sections. The employment of a single section to hold a bridge or defile is, of course, legitimate, but exceptional.

"Sec. 12 should be read, but by no means acted on, by the officer commanding a small force of all arms. We are all so familiar with the spectacle of a battery of horse artillery drilling in brigade with a single regiment of cavalry that we are apt to forget that this is drill only, and that if our cavalry and artillery were not scattered in garrisons and stations we should never see a horse artillery battery attached to a smaller cavalry brigade than one of three regiments. A Brigadier-General with even the large proportion of four squadrons and two batteries attached to his infantry brigade will probably find it necessary to employ two squadrons as a screen, and two for general purposes near his main body. If he does detach a battery with all he can spare of his cavalry, the latter will generally be sent as escort to the battery, and have to conform to the movements of the guns, while a little study of Sec. 12 will, I think, bear out the assertion that horse artillery

acting, in the proper sense, with cavalry form, so to speak, the escort for the cavalry.

"Sec. 13 should be studied by C.O.'s and umpires at manœuvres. Many smart batteries trot about with what, under service conditions, would be empty limbers. A major of artillery desirous, as all are, of saving his horses may be pardoned for 'going through the motions' only, if the latter course is considered satisfactory by those in authority over him.

"Sec. 14, para. 1, at first sight, reads as if it were only applicable to an officer commanding at least 16 batteries of artillery, and he, of course, would not be likely to fall under the command of a Brigadier-General. But, in fact, the whole section, with very little modification, applies to the C.R.A. of any detached (mixed) force, however small the number of guns may be. It is most important that the C.R.A., be his command a brigade division, a battery, or a section, should, up to the time he leads his guns into action, be in touch with the officer commanding the troops. He should be with his command on the march, but immediately an engagement seems imminent, he should join the officer commanding the force and ask for orders.

"As in nine cases out of ten the choice of the first artillery position will determine the form and direction of the infantry attack, it is probable that the officer commanding the force and the C.R.A. will jointly reconnoitre the ground and the enemy. I may, perhaps, remark here that at war-games, although, perhaps, not at manœuvres (certainly not on service), officers commanding forces seem afraid to leave their infantry and to go on and watch the artillery fight.

"Sec. 15, note first para. on page 176. The principle asserted is that artillery is an encumbrance to a weak advanced guard. To justify its presence it, and the advanced guard it supports, must be of sufficient strength to seize and hold till reinforced some important tactical position.

"Secs. 16, 17. No remarks.

"Sec. 18. I have hinted at a weakness in our military vocabulary which makes the term field artillery synonomous, even in some official books, with field batteries. There is a somewhat analogous confusion in the use of term 'escort.' It is a pity that some distinction in terms is not possible between the escort of artillery and the escort of a convoy, and again between the different kinds of artillery escorts.

"Artillery escorts are of two natures, and each of these natures may have two different sets of duties to perform.

"Inventing some terms I class them as follows:—

"A. *Patrol Escort.*—Must be mounted. Duty, so to lead artillery that the latter does not, without due warning, come within 1,500 yds. of the enemy.

"B. *Picquet Escort.*—The same body of mounted troops (cavalry or infantry) disposed on the flanks of artillery in action so as to give warning of the approach of any hostile bodies.

"C. *Moving Combat Escort.*—Preferably, but not necessarily, mounted. Duty, to meet and drive back any attack made by the enemy on artillery in motion.

"D. *Position Combat Escort.*—Cavalry or infantry posted so as to protect the exposed flank of artillery in action.

"It is important to remember to direct the officer commanding an escort to ask the C.R.A. for orders.

"The management of an escort demands more practice than artillery officers are generally afforded.

"Artillery advancing into position will be reduced to a walk if the patrol escort scouts do not gallop out.

"An artillery commander suddenly attacked while in action should himself decide whether he will, by diverting his fire from the original objective, protect himself or leave the fresh enemy to be dealt with by the escort. If the decision be left (as is not infrequent) to the officer commanding the escort, the latter may, by over zeal, mask the guns or, on the other hand, by refraining from action, cause the artillery fire to be turned on to a wrong objective.

"Yet, again, an infantry moving combat escort may creep on under cover to within a short distance of its artillery position while the guns are 'preparing to advance,' if the escort commander knows what is going on, whereas the more general practice is for the infantry to employ this time in resting, and so preparing for the expected hasty scramble after the dashing and adventurous gunners.

"In the absence of mounted scouts, a battery can find its own combat patrols and videttes, but to do so, it has to employ men whose legitimate duty is ground-scouting, and the latter important duty is apt to be neglected.

"The last section calls for no remark."

Passage of Rivers by Cavalry.—An important step to facilitate the passage of rivers by cavalry has been initiated by Lieut. M. F. Rimington, of the Inniskilling Dragoons. He has had some cornsacks made up according to the regulation pattern, out of Willesden waterproof canvas. Each sack when stuffed with straw or hay will float a weight of 150 lbs., and when lashed together in any required number to a framework of light poles or lances, a most efficient raft can be formed. A few days ago a squadron of 66 horses was taken across the bridging pond at Aldershot, by these means, in twenty minutes. The best plan was found to be, to make a long rope out of the head-ropes, picket it across the river or stream, and let one man on the raft work it across hand over hand. A few boards, or the tail board of a squadron cart made it comfortable to stand on. A single sack will hold a saddle with kit complete, with these in it will float and can be towed across. They may also be easily rigged up with lances as poles to form a shelter tent, and can be used as a waterproof cape, &c.

Aluminium Camp Cooking Gear.—In reply to many inquiries received, we may state that Messrs. Braby and Co., Fitzroy Works, Euston Road, are making a very convenient form of camp cooking gear; three pans nested one inside the other with lids fitted as frying pans, &c., and of sufficient capacity, at a weight of 3 lbs. 8 ozs., against nearly 12 lbs. in block tin. The price is very high—5*l.*—but will doubtless come down soon as aluminium can now be turned out in bulk at 1*s.* the lb.

Smokeless Powders.—From a pamphlet sent to us by Mr. Gustave Roos, representative in this country, India, and the Colonies for the powder adopted by the Swiss Government, and now called the "Normal Powder," we extract the following notes.

The basis of the Normal powder is guncotton. At the time of the adoption of cordite (nitro-glycerine base), "Normal powder" was not before the public or the Committee, and cordite gave from 20 to 25 per cent. better initial velocity than any guncotton compound then on the market.

It was soon found that cordite endangered the life of the barrel in which it was used, and this was attributed to the friction of the bullet moving at a high velocity against a very sharp twist in the rifling.

With the "Normal powder," since introduced, under exactly similar conditions and with charges giving even higher velocities, the life of the gun-barrel has been proved to exceed that of the barrel used with cordite tenfold. The cause is attributed to the lower temperature of combustion of the guncotton compound. It was proved by official trials in Sweden that, firing under identical conditions, ballistite (a nitro-glycerine powder) raised the temperature of the barrel to 464° F. against 284° F. with the Normal powder. The Normal powder has also proved its endurance under extremes of climatic variations.

This Journal cannot take sides in the cordite controversy, but in the interests of the Service it is bound to bring new facts as they arise to the attention of its readers.

France.—With reference to the recent accident at Châlons, where the breech of a field piece was blown out, killing two men, it appears from evidence taken that the screw threads of both breech piece and gun were found uninjured. The explana-

tion given by the "Avenir" is that the vibration due to the long gallop up into position (loaded) caused the breech piece to revolve a third of a circle, so that the threads did not interlock at the moment of firing. How it was possible for the gun to be fired under the circumstances is not accounted for.

The great plain near Châteaudun, on the Orleans Road, has been selected for the grand review of the 4th and 11th Corps under General the Marquis of Gallifet. ("L'Avenir Militaire." No. 1900.)

The cost of the expedition to Dahomey, 1893, totals up to 10 million francs, the estimated expenditure provided for in the budget of that year was 900,000 francs only. ("La France Militaire." No. 3055.)

General Vasseur, commanding the 11th Corps, Nantes, has issued instructions that the cavalry in his command are to be practised in the use of the carbine at ranges exceeding 1,000 m. ("L'Avenir Militaire." No. 1891.)

Germany.—The following important alteration in the regulations for bringing forward complaints by privates in the army has been gazetted. Under the old system the complaint had to be lodged with the man's immediate superior, who might very well happen to be the man against whose oppression it was directed, and when once lodged the complainant had no means of ascertaining whether it was transmitted to the proper quarter, or how it had been dealt with.

The great reform effected by the new regulations consists in these two points—viz., that the private is allowed in future to complain directly to the captain commanding his company, and that the result is to be communicated to him through the same channel. With considerable experience of the inner working of Prussian companies, we believe that this will form a most important guarantee against ill-usage. No men have been more anxious to put a stop to the acts of oppression which from time to time have occurred, and tended to embitter the relations between men and officers; but under the old system they were practically unable to interfere, except in cases which came directly under their personal observation. There can be no doubt that this concession will strike a heavy blow at the agitation the Socialist editors have been making for some years past in order to discredit the officers in the eyes of the working classes.

In order to protect the men from the consequences of hasty action on their own part, it is further ordered that no complaint is to be lodged until the day following that on which the alleged act took place.

Autumn Manœuvres.—The annual grand manœuvres of the German Army in the presence of the Emperor, in which the 1st and the 17th Army Corps will be engaged during the second week of September, near Bromberg, on the Polish frontier, are expected to be of even more than usual interest. For the first time on this occasion they will afford an opportunity of testing the effect of the new Army Law of 1893 upon the efficiency of such large bodies. The reduction of the term of service with the colours from three years to two has now come into full effect, and unmounted troops taking part in this year's manœuvres will be almost exclusively composed of men of less than two years' standing. In this respect alone the coming manœuvres will attract special attention as marking a new era in the military history of Germany.

But there will also be several other features of novel interest. Ten battalions of infantry will be experimentally furnished with the new field kit of reduced weight. The use of bicycles for the transmission of orders, and, generally, for keeping up communications in the field, will be tested on a large scale, with a view ultimately to relieve the cavalry of a great part of the duties they have hitherto been called upon to perform in this connection. Experiments will also be made with the new folding boats which have been ordered from England for the cavalry. They are to be attached to the leading squadron of every cavalry regiment to facilitate the crossing of streams and canals while reconnoitring and covering the advance of

the main body. Night manœuvres with cavalry are stated to be also contemplated, and as the Emperor will himself take the immediate command in turn of the two divisions of cavalry engaged, there is no doubt that interesting developments may be looked for in connection with this arm of the Service. ("The Times," 8th July.)

FOREIGN PERIODICALS.

NAVAL.

Mittheilungen aus dem Gebiete des Seewesens.—Pola and Vienna. No. VII. 1894. "Electric Gun Fittings" (*conclusion*). "Toulon and the French Mediterranean Fleet." "Simple Tables for Calculating the Correction for Finding the True Midday and Midnight." "Notes on the English, Italian, and United States Navies." "On the Most Economical Speed of Ships" (a study).

Revue Maritime et Coloniale.—Paris. June, 1894. "Geometry of Diagrams, Some Economic Questions on Indicator Curves." "The Influence of Sea-Power on History;" translated from Captain Mahan's work. "The Harbour and Maritime Quarter of La Seyne." "Statistics of Shipwrecks for 1892." "Foreign Naval Chronicle." "Report of the Sea Fisheries."

Revue du Cercle Militaire, June, Nos. 23, 24, 25; "A Study of Naval Tactics."

Le Yacht.—Paris. 2nd June, 1894. "The New Minister of Marine." "Naval Notes, Home and Foreign." "The English Battle-ship 'Hood,'" (with plate). 9th June. "New Building Programme for 1895" (E. Weyl). "Naval Notes, Home." "Launch of 'Cassini' and Trials of the New Torpilleurs-de-haute-mer 'Tourmente' and 'Argonaute.'" 16th June. "Lord Brassey's Naval Annual" (E. Weyl). "Naval Notes, Home and Foreign." "New Japanese Cruiser 'Yoshino,'" (with plate). "New Regulations for Navigation Certificates for Pleasure Boats." 23rd June. "Admiral Vallon's Report on the 'Magenta'" (E. Weyl). "The Habitability of Aluminium Vessels." "The American Yacht 'Vigilant.'" "Naval Notes, Home." 30th June. "The late President Carnot" (E. Weyl). "Japan and French Building-yards" (E. Weyl). "The Cadres of Officers of the Navy." "The English Torpedo-destroyers 'Havock' and 'Hornet,'" (with plate). "Naval Notes, Home."

La Marine de France.—Paris. 2nd June, 1894. "Cruiser and Coast Warfare." "The French Navy in the Spring of 1894." "The Aluminium Yacht 'Vendenesse.'" "Naval Notes." 9th June. "The Maritime Postal Services." "The Budget of 1895." "The French Navy in the Spring of 1894." "Naval Notes." 16th June. "From the Quai d'Orsay to the Rue Royale." "Railways and Water Routes." "Naval Notes." 23rd June. "Mail-boats" (Rear-Admiral Réveillère). "The Budget of 1895." "Fleet Evolutions." "Yachting and the Chamber of Deputies." "Naval Notes." 30th June. "Mail-boats" (Rear-Admiral Réveillère), 2nd Article. "The Budget of 1895." "A Question of Naval Tactics." "Naval Notes."

Le Moniteur de la Flotte.—Paris. 2nd June, 1894. "The Battle of the 13th Prairial (1st June, 1794)." "The Extra-Parliamentary Enquiry into the Navy." "The Torpedoing of the 'Aquidaban.'" "The Society for Helping Shipwrecked Seamen." "Naval Notes, Home and Foreign." 9th June. "The New Minister of Marine." "Designs of Ships in England." "Our New Ships." "Naval Notes,

Home and Foreign." 16th June. "L'Arc de Triomphe." "The Extra-Parliamentary Enquiry into the Navy." "The Navy in Parliament." "Naval Notes, Home and Foreign." 23rd June. "On the Fire of Coast Batteries." "The Navy in Parliament." "The Extra-Parliamentary Enquiry into the Navy." "Naval Notes, Home and Foreign." 30th June. "M. Carnot." "The Navy in Parliament." "Naval Notes, Home and Foreign."

Marine Rundschau.—Berlin, June, 1894. "On the utilisation of Ship's Distilling Apparatus when men are landed" (Dr. Davids, Naval Staff-Doctor). "The Foundering of the Training-ship 'Amazon' off the Dutch coast in November, 1861." "A Cruise for Information on board fast steamers." "Foreign Naval Notes." "Promotions and Appointments."

See also *Jahrbücher für die Deutsche Armee und Marine*, May, 1894, "A Strategic Glance at the Mediterranean," by Lieut.-Colonel von Hildebrandt; and *Militär-Wochenblatt*, 4th July, "The English Naval Estimates for 1894–95," by Stenzel Kapitän zur See.

Rivista Marittima.—Rome. June, 1894. "Sir WalterRaleigh" (Carlo Segrè). "Considerations on the first phase of the Italian Naval Manœuvres, 1893" (D. Bonamico). "The Subsidies to our Mercantile Marine" (Dr. A. Teso). "On the Administration of the Material in Naval Arsenals." "On the Regulation and Administration of the Naval Personnel" (A. de Angelis). Letters to the Director: "On the Oil used for calming waves" (P. de Revel). "On the Administration of the Naval Personnel" (A. de Orestis). "Naval Notes" (Home). "Trials of battle-ship 'Sardegna' and cruiser 'Umbria'" with plates. "Naval Notes" (Foreign). "France, England, Germany, Russia, and United States." "The Mercantile Marine of the principal Nations of the World."

Rassegna Navale.—Rome. May, 1894. "Naval Strategy." "Electrical Ventilators." "Torpedo-boats in conjunction with Battle-ships." "The Administration of the Personnel of the Navy." "The Resistance of the Water which a Ship has to overcome."

Morskoi-Sbornik.—St. Petersburg. April, 1894. "Regulations for the Administration of the Baltic Ship-building and Engine Works." "Changes in the Staff of the Ministry of Marine and Harbour Administrations." "Report of the Court-martial on the Loss of the Armoured Monitor 'Rusalka.'" "The Mechanical Solution of Problems in Nautical Astronomy." "On the Present Condition of the Diving Establishment in our Fleet."

Rivista General de Marina.—Madrid. June, 1894. "Description of the Turrets of the Battle-ship 'Pelayo.'" "Some considerations on the Geodetical and Astronomical Connections of Algiers with Spain" (Señor Don Rafael y Serna). "Official Report of the Naval Section at the Chicago Exhibition." "Vocabulary of Powders and Modern Explosives"—(*continued*). "Naval Notes" (Foreign). "A Survey of the Construction of Firearms and the Proofs to which they are subjected before Acceptance" (with plates).

Tidskrift i Sjöväsendet.—Carlscrona. Nos. 2 and 3. 1894. "The Year's Report on Gunnery." "The Fleet in the past year." "How can the Advantages afforded by the extended periods of time of Service and Training of the Seamen be best utilised for the Fleet?" "The Fleet and the Regulations for Service at Present and in the Future." "A further word about the Organization of the Artillery Corps in Carlscrona."

Proceedings of the Naval Institute.—Annapolis. January, 1894. No. 1. Prize Essay by Lieut.-Commander Schroeder, U.S.N., "The U.S.S. 'Vesuvius,' with special reference to her Pneumatic Battery" (with discussion). "The Johnson Cast-steel Armour-piercing Shot" (with plates). "The Battle of La Placilla." "Notes on the Literature of Explosives." "Cleaning the Bottom of Steel Ships by Divers when Docking is impracticable" (Lieut.-Commander Sebree, U.S.N.).

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Revue Maritime et Coloniale.—Paris. June, 1894. "Geometry of Diagrams, Some Economic Questions on Indicator Curves." "The Influence of Sea-Power on History;" translated from Captain Mahan's work. "The Harbour and Maritime Quarter of La Seyne." "Statistics of Shipwrecks for 1892." "Foreign Naval Chronicle." "Report of the Sea Fisheries."

Revue du Cercle Militaire, June, Nos. 23, 24, 25; "A Study of Naval Tactics."

Le Yacht.—Paris. 2nd June, 1894. "The New Minister of Marine." "Naval Notes, Home and Foreign." "The English Battle-ship 'Hood,'" (with plate). 9th June. "New Building Programme for 1895" (E. Weyl). "Naval Notes, Home." "Launch of 'Cassini' and Trials of the New Torpilleurs-de-haute-mer 'Tourmente' and 'Argonaute.'" 16th June. "Lord Brassey's Naval Annual" (E. Weyl). "Naval Notes, Home and Foreign." "New Japanese Cruiser 'Yoshino,'" (with plate). "New Regulations for Navigation Certificates for Pleasure Boats." 23rd June. "Admiral Vallon's Report on the 'Magenta'" (E. Weyl). "The Habitability of Aluminium Vessels." "The American Yacht 'Vigilant.'" "Naval Notes, Home." 30th June. "The late President Carnot" (E. Weyl). "Japan and French Building-yards" (E. Weyl). "The Cadres of Officers of the Navy." "The English Torpedo-destroyers 'Havock' and 'Hornet,'" (with plate). "Naval Notes, Home."

La Marine de France.—Paris. 2nd June, 1894. "Cruiser and Coast Warfare." "The French Navy in the Spring of 1894." "The Aluminium Yacht 'Vendenesse.'" "Naval Notes." 9th June. "The Maritime Postal Services." "The Budget of 1895." "The French Navy in the Spring of 1894." "Naval Notes." 16th June. "From the Quai d'Orsay to the Rue Royale." "Railways and Water Routes." "Naval Notes." 23rd June. "Mail-boats" (Rear-Admiral Réveillère). "The Budget of 1895." "Fleet Evolutions." "Yachting and the Chamber of Deputies." "Naval Notes." 30th June. "Mail-boats" (Rear-Admiral Réveillère), 2nd Article. "The Budget of 1895." "A Question of Naval Tactics." "Naval Notes."

Le Moniteur de la Flotte.—Paris. 2nd June, 1894. "The Battle of the 13th Prairial (1st June, 1794)." "The Extra-Parliamentary Enquiry into the Navy." "The Torpedoing of the 'Aquidaban.'" "The Society for Helping Shipwrecked Seamen." "Naval Notes, Home and Foreign." 9th June. "The New Minister of Marine." "Designs of Ships in England." "Our New Ships." "Naval Notes,

Home and Foreign." 16th June. "L'Arc de Triomphe." "The Extra-Parliamentary Enquiry into the Navy." "The Navy in Parliament." "Naval Notes, Home and Foreign." 23rd June. "On the Fire of Coast Batteries." "The Navy in Parliament." "The Extra-Parliamentary Enquiry into the Navy." "Naval Notes, Home and Foreign." 30th June. "M. Carnot." "The Navy in Parliament." "Naval Notes, Home and Foreign."

Marine Rundschau.—Berlin, June, 1894. "On the utilisation of Ship's Distilling Apparatus when men are landed" (Dr. Davids, Naval Staff-Doctor). "The Foundering of the Training-ship 'Amazon' off the Dutch coast in November, 1861." "A Cruise for Information on board fast steamers." "Foreign Naval Notes." "Promotions and Appointments."

See also *Jahrbücher für die Deutsche Armee und Marine*, May, 1894, "A Strategic Glance at the Mediterranean," by Lieut.-Colonel von Hildebrandt; and *Militär-Wochenblatt*, 4th July, "The English Naval Estimates for 1894–95," by Stenzel Kapitän zur See.

Rivista Marittima.—Rome. June, 1894. "Sir WalterRaleigh" (Carlo Segrè). "Considerations on the first phase of the Italian Naval Manœuvres, 1893" (D. Bonamico). "The Subsidies to our Mercantile Marine" (Dr. A. Teso). "On the Administration of the Material in Naval Arsenals." "On the Regulation and Administration of the Naval Personnel" (A. de Angelis). Letters to the Director: "On the Oil used for calming waves" (P. de Revel). "On the Administration of the Naval Personnel" (A. de Orestis). "Naval Notes" (Home). "Trials of battle-ship 'Sardegna' and cruiser 'Umbria'" with plates. "Naval Notes" (Foreign). "France, England, Germany, Russia, and United States." "The Mercantile Marine of the principal Nations of the World."

Rassegna Navale.—Rome. May, 1894. "Naval Strategy." "Electrical Ventilators." "Torpedo-boats in conjunction with Battle-ships." "The Administration of the Personnel of the Navy." "The Resistance of the Water which a Ship has to overcome."

Morskoi-Sbornik.—St. Petersburg. April, 1894. "Regulations for the Administration of the Baltic Ship-building and Engine Works." "Changes in the Staff of the Ministry of Marine and Harbour Administrations." "Report of the Court-martial on the Loss of the Armoured Monitor 'Rusalka.'" "The Mechanical Solution of Problems in Nautical Astronomy." "On the Present Condition of the Diving Establishment in our Fleet."

Rivista General de Marina.—Madrid. June, 1894. "Description of the Turrets of the Battle-ship 'Pelayo.'" "Some considerations on the Geodetical and Astronomical Connections of Algiers with Spain" (Señor Don Rafael y Serna). "Official Report of the Naval Section at the Chicago Exhibition." "Vocabulary of Powders and Modern Explosives"—(*continued*). "Naval Notes" (Foreign). "A Survey of the Construction of Firearms and the Proofs to which they are subjected before Acceptance" (with plates).

Tidskrift i Sjöväsendet.—Carlscrona. Nos. 2 and 3. 1894. "The Year's Report on Gunnery." "The Fleet in the past year." "How can the Advantages afforded by the extended periods of time of Service and Training of the Seamen be best utilised for the Fleet?" "The Fleet and the Regulations for Service at Present and in the Future." "A further word about the Organization of the Artillery Corps in Carlscrona."

Proceedings of the Naval Institute.—Annapolis. January, 1894. No. 1. Prize Essay by Lieut.-Commander Schroeder, U.S.N., "The U.S.S. 'Vesuvius,' with special reference to her Pneumatic Battery" (with discussion). "The Johnson Cast-steel Armour-piercing Shot" (with plates). "The Battle of La Placilla." "Notes on the Literature of Explosives." "Cleaning the Bottom of Steel Ships by Divers when Docking is impracticable" (Lieut.-Commander Sebree, U.S.N.).

"On Gun-shot Injuries produced by the new Small-calibre Bullets" (Dr. Beyer, U.S.N.). "Professional and Bibliographic Notes."

See also *The United Service.—U.S.A.* July, "The Engineer Corps of the U.S.N." (*continued*), F. M. Bennett, U.S.N. The "Origin and Developments of Steam Navigation," the late Admiral Preble, U.S.N.

MILITARY.

The United Service.—U.S.A. July. "The Engineer Corps of the United States Navy" (*continued*), F. M. Bennett, U.S.N. "Regulations and Manœuvres of the Russian Field Artillery," Captain S. Lushington, R.A. "Exchange of Stations," Captain Brinkerdorf, U.S.A. "Origin and Developments of Steam Navigation," Admiral Preble, U.S.N. "Notes on Cavalry," really remarkable as a model of misinformation.

Journal of the Military Service Institution.—"American Military Roads and Bridges," Michie. "The Nicaragua Canal," Lieut. Hamilton, "Portable Intrenching Tools," Lieut. Wren. "The Medical Department of the Army," Major Smart. "The Infantry and Cavalry School," Captain Carter. "Infantry Officers' Field Equipment," Lieut, Johnson.—Comment and Criticism. The Military Handlitter. The Management of a Post Hospital. Wire Gun Construction. "Should the Fixed Coast Defences of the United States be Transferred to the Navy?" Weaver. "Infantry Foot Wear,"—Historical Sketches. "The Quartermaster's Department." "The Seventh Regiment of Infantry."

Organ der Militär-Wissenschaftlichen Vereine.—Vienna. "Mobile Siege Battery Groups," Miksch, Captain K. K., artillery. "The Captain of Infantry as an Instructor," Major Kövess von Kövesháza. Book Notices, &c. Special attention is called to the classified index of subjects appearing in all European Military Journals—most valuable for reference.

Journal des Sciences Militaires.—June. "Dernier Effort," by General Philebert—should be read. "The Fire and Conduct of Infantry in Action," by General Libermann. "Apparatus to Demonstrate the Effect of Infantry Fire on Inclined Ground," by General Mille. "The Campaign of 1814," by Weil. "Musketry Instruction in France and Germany," by M. Henri Barande—severe criticism of French methods; musketry is *corvée* to be got through as quickly as possible. "The Conception of Victory," by Droien.

Revue Militaire de l'Étranger.—"The German War Budget for 1894–95." "Reinforcements to the Cadres and Effectives of the Austro-Hungarian Landwehr." "The Pamir Question." "The Conditions of Promotion in the Austro-Hungarian Army."

Revue des Deux Mondes.—15th June. "La France et l'Allemagne dans l'Afrique Centrale," by M. Rouire.

Spectateur Militaire.—13th June. "The Spirit of Modern War;" review of Colonel Henry's work; pith of the matter is this: the Germans beat the French in 1870 because they had understood and worked out the Napoleonic methods which the French themselves had forgotten. "The War in the East." "Sarregue mines in 1870," Camille Wolf; minor details from regimental sources; not interesting.

L'Avenir Militaire.—1st June. "Instruction Militaire et Dispense;" most powerful indictment of existing conditions in the army, and advocates paid substitutes. "L'Affaire Turpin;" interviews with the inventor; interesting. "An Extraordinary Order;" issued by the G.O.C. 8th Corps, showing slackness in execution of standing orders. "Skeleton Batteries;" calling attention to undermanned field batteries. "Civil Employment;" we do not stand alone in our difficulties. "The Artillery of Independent Cavalry." "Report of the Commis-

sion of Inquiry on the 'Magenta';" angle of heel, when helm put hard over at full speed, 9°. 5th June. "Dispense et Instruction Militaire;" very interesting, read. "Ney et Jomini;" anecdote. "More about Turpin." "Gaspillage;" waste in army clothing contracts. "The Naval Budget." "Interview with Colonel de Bange." "French Policy in the far East;" treaties with Annam and notes on development of country. 8th June. "Three Questions to the War Ministry;" leader on General Mercier's recent replies in the Chamber. "Reserve Store of Horse-shoes and the War Department;" horse-shoes in reserve condemned *en bloc* as worthless. "The Pontoneers in the Senate." "Fatal Accidents with Blank Cartridge;" as in England, a ball cartridge sometimes finds its way into the blank. "The Army in Parliament." 12th June. "The Pontoneers and the Senate." "The Schools of Instruction." 15th June. "An Additional Article to the Law Reforming the Pontoneers." "Le Brevet d'Instruction Militaire;" further correspondence advocating paid substitutes. "The Army in Parliament." 19th June. "Misdirected Economy." "Re-engagement of N.C.O.'s." "The Mobilisation of the Reserve Cavalry." "Our General Staff;" private letters, dated 1880, by a very highly-placed General Officer to the President of the Chamber of Deputies, very important; reminds one of the Duke's private notes on his Generals and Staff. "The Army in Parliament." 22nd June. "Article 5 of the Law on Recruiting." "Excès de Pouvoir;" calls attention to the mass of regulations existing and the habit of corps commanders and others of introducing modifications; should be read. "The Working of the Clothing Department." "The Army in Parliament." 26th June. "President Carnot." "Le General X——;" purporting to reveal the intrigues around the Minister of War. "Reserve Officers;" with reference to recent complaints. "Maladministration in the War Departments." 29th June. "President Casimir-Perier." "Studies in Infantry Fire Tactics;" review of General Libermann's book: nothing new. "Canteens and Mess."

Revue du Cercle Militaire.—3rd June. "Snow Shoes and the Corps of Skaters in the Norwegian and Swedish Armies." "The New Italian Musketry Regulations." "A Study in Naval Tactics;" review of Commander Sturdee's, R.N., R.U.S.I. Gold Medal Essay. "The Cossacks in the 16th Century." 10th June. "The New Italian Musketry Regulations." "A Study in Naval Tactics." "The Cossacks in the 16th Century." "The Dowe Cuirass" (*conclusion*); valueless for military purposes. 17th June. "The Buffer State on the Mekong." "The Swiss Army in 1893." 24th June. "The Frontiers of Cameroon." "The Swiss Army in 1893."

Revue d'Artillerie.—June. "General Summary of Existing Artilleries," by Captain Moch, memoir written for the Chicago Exhibition." "The Russian Rifle, Model 1891," by Captain Fraenkel. "*Résumé* of the Principal Experiments carried out in Austria, 1891–92." "A Rapid Method to determine Distances, when concentrating Guns of Coast Batteries fitted with the Deport Mechanism."

Revue de Cavalerie.—June. "The Divisional Squadron on the March at the Outposts and in Action." "The Italian Cavalry." "Reinforcements of Cavalry and Remounts for the Grand Army, 1806—1807;" read. "Racing in the Army." "The Lance, opinion of General Brahaut." "Russian Horses;" worth reading.

Militär-Wochenblatt.—No. 47. "The Readiness for War of Switzerland;" very well worth reading. "The Results of the French Government Stud Management, 1892." No. 48. "The 1st (Royal) Dragoons;" short summary of the regimental history written *à propos* of the Emperor's Colonelcy. "v. Löbell's Jahresberichte;" summary of contents. "The Cavalry School at Saumur." No. 49. "Colombey-Nouilly;" review of Scherff's new book. "Supply of Reserve Officers and their Military Status in France." "Military Notes from Russia." No. 50. "Colombey-Nouilly"—(*conclusion*). "Experimental Firing in the English Field Artillery;" from the R.A. Institute papers. "The Reform of the Polytechnic in Paris." No. 51. "The Psychology of War;" review of the second volume of an Austrian work, signed C. v. B.-K., dealing with the Jena Campaign. "The Proposed New Cavalry Regulations;" all these articles deserve careful study

No. 52. "Reduction of Ammunition carried by the Soldier." "U.S. Naval Budget." No. 53. "Herwarth v. Bittenfeld;" lecture. No. 54. "The War in La Vendée, 1793-96," by Boguslawski. "Field Service Tents for Officers." No. 55. "The New Cavalry Regulations." "The War in La Vendée"—(*concluded*). "Field Artillery in Manœuvres and in War." "The British Naval Estimates," v. Stenzel.

Jahrbücher fur die Deutsche Armee und Marine.—July. "A Military Tourist's Notes in the Sandjak Novi Bazar and in Montenegro;" Captain Baumann. "The New Regulations for the Swiss Cavalry." "French Frontier Defences." "Les Alpes Maritimes," by Graf von Haslingen." "The Drill Books of the 1st Republic and Empire;" a very important contribution to the question of the evolution of small column and skirmisher tactics. Menil Durand had very little to say in the matter. "Two-horse batteries in a Predicament;" note on Dahlgreen's raid, March, 1864. "Frederic the Great and General Chasot."

NOTICES OF BOOKS.

History of the British Standing Army, 1660—1700. By the late Colonel CLIFFORD WALTON, C.B., A.A.G., dedicated, by permission, to Field-Marshal H.R.H. the Duke of Cambridge. London: Harrison and Sons, 1894. Price 21*s*.

This work, now shortly about to appear, promises to be of great interest to the Services. The originals of the illustrations were exhibited at the Naval and Military Exhibition of 1892, where they attracted considerable attention for their extraordinary fidelity and accuracy. Unfortunately, owing to the death of their author, it became impossible to guarantee the expenses of their reproduction, hence, since the absence of illustrations does not interfere with the comprehension of the text, the latter alone is being published. The original illustrations, together with the authorities and notes from which the details have been taken, have been presented to the Royal United Service Institution, Whitehall Yard, London, where they may be seen and consulted.

It had been Colonel Walton's intention to have continued his history down to the present time, and, from what we have seen of his work, we can only regret most sincerely that he was not spared to complete his task. F. N. M.

Allgemeine Lehre von der Truppen-fuhrung im Felde. Von J. MECKEL. Berlin: Mittler.

In previous book notices we have already discussed the recent works of Hoenig, Scherff, and Malachowski, but these notices would be incomplete without some reference to Meckel, who, as far as our knowledge of contemporary German tactical opinion goes, enjoys by far the highest consensus of approval of any known writer on these subjects.

In the old days when men wrote about tactics they usually deduced their conclusions from an experience of years of active service campaigning, and, moreover, they generally assumed an equal degree of practical knowledge on the part of their readers, which assumption rendered them somewhat unintelligible to their peace-trained successors. For the purposes of this article, we may consider the campaigns of 1866 and 1870 practically as one, for, at the outside, no one in the Prussian Army got more than three days' actual hard fighting out of the former, and many had to content themselves with only one; but that one or three were a revelation to them. Still, including both wars, the total experience of the greatest fire-eater was but trivial to that of their forerunners, and seeing the facilities for rushing into print that

now exist, we need not be surprised if many of them proceeded to generalise from very insufficient data. If one casts a glance back over the earlier pamphlets that succeeded these wars, one cannot fail to be struck by the limited area comprised from each author's standpoint. Without even glancing at the title-page, one can allocate with precision each writer's rank and branch of the Service, and further one can detect the precise degree of previous historic study each brought to his self-imposed task.

Broadly, the impression conveyed is "Regimental." Men had seen their comrades fall around them; they were new to the business, and the impression left on their minds was indelible. They did not stop to inquire into ultimate causes, nor did they analyse percentages. Men had fallen around them, the sight was horrible, the impression lasting, and the proximate cause in the second campaign, bullets originally inserted at the breech not the muzzle.

Meckel, whose first edition, to the best of our recollection, appeared in 1875, was the first who took hold of his facts and correlated them in the order of their relative importance. He pointed out, or, better, recalled, the fact that death and wounds were inevitable consequences of the collision of armed forces, and that the percentages of loss inflicted in the recent campaigns were by no means unusual, but on the whole decidedly below, not above the average. In a table of averages of loss in different campaigns he showed that during the Seven Years' War and the Napoleonic era the percentage of loss ran decidedly higher, yet, as he says, "we do not learn that Frederic's officers spent their leisure hours in winter quarters in reading papers to show how the losses of the next campaign might be avoided." This sneer did more perhaps than anything else to recall the army to a sense of its duty, and from that period dates in the German combatant officers the fall of the "Verlustscheue epidemic," the epidemic disease of the avoidance of losses.

Further, he gripped the whole subject from the General Staff officer's point of view as opposed to the "Regimental." He looked at the question from the Napoleonic standpoint, and saw the battle through his eyes, as Clausewitz has explained it to us. It was the process of attrition not the decision at a blow, the end and purpose of Frederic's line tactics—"On s'engage partout et on voit"—long lines of tirailleurs gradually absorbing the small columns behind them, and mutually wearing out one another's endurance: behind them Napoleon with his massed reserves, curtly refusing all demands of his lieutenants for reinforcements, and thus retaining in his hands, by reason of his superior indifference to human life, the last closed supports with which to give the decision. Viewed from this point, though he does not say so, the combats of the 1870 war never attained the dignity of battles at all, for the last appeal to the closed reserves was never called for, and only once attempted, at Vionville.

To him the force of an army is the product of four factors: the ability of the cavalry to find and locate their enemy, of the artillery and first line of infantry to wear down his resistance, of the closed reserves to complete the overthrow, and of the capacity of the General Staff to arrange that that final closed reserve is forthcoming when needful.

Throughout his work he appears handicapped by the need of avoiding the susceptibilities of the rest of his army and of his superiors, but, as an example, to show how correctly he had seen and appreciated the true occurrences of the war, the following quotation will suffice. After discussing the proper conduct of a battle, he writes: "But if we look back at the recent past, a different picture unfolds itself. The pitiable self-destructive consequences of the belief in the unavoidable disorder and the uncontrollable individual order are completely disclosed in the occurrences of the past 10 years. Here, too, we hear the drums beating the charge, and see the unfurled flags; here, too, we see whole brigades moving to the assault, only to break before the unshaken fire power of the adversary, and everything is torn away in the tumult of the individual order. Woods, villages, hollows, previously empty, suddenly fill with leaderless masses, and only the open fields lie tenanted with the dead, victims of premature violence. But turn the matter about—let fire go before the bayonet, the thunder of the guns before the beat of the drums, true skirmishing before the open assault, not after it—and the battle will regain its normal healthy appearance."

It is impossible in our space to do justice to this really remarkable work; we can only warmly commend it to our readers, entreating them, however, to remember that it was written before the recent revival of the line traditions, and that the author views the battle only from the Napoleonic, *i.e.*, the "method of attrition" standpoint, not from the Frederician, "the method of the blow." F. N. M.

Travels amongst American Indians: their Ancient Earthworks and Temples, including a Journey in Guatemala, Mexico, and Yucatan. By Vice-Admiral LINDESAY BRINE. London: Sampson Low, Marston and Co., 1894.

Next to the preparation of his men for war, the best occupation an officer can find for his time is exploring hitherto little known countries, but the value of his work depends on his trained skill in observation, and the habit of accurately recording things as he actually sees them. Admiral Brine's book is a model of what a work of this kind should be, an accurate record of things and people as he found them, and we therefore venture to recommend it to our readers, though its scope is somewhat outside the ordinary range of this Institution.

His object is to elucidate the problem presented by the prehistoric remains of the races which have inhabited the American Continent.

We have no space to follow his footsteps in detail. Briefly, his conclusions are these: The earliest mound builders of North America were essentially a fighting and hunting race. Moved by rumours of riches and plunder in districts to the southward, or perhaps merely instigated by that migratory instinct to which history teaches us all rude semi-civilized races are liable, they swept down on the civilized nations in the Mexican Peninsula and promptly reduced them all to slavery, and with a fine instinct for human weaknesses, probably also with some little knowledge of hypnotism and natural magic, they seized on the priestly power and enforced their authority by bloody and cruel sacrificial punishments.

The time limit he gives us is amply sufficient for his purpose. This conquest and subjection of a non-fighting race is no new thing; we find abundant analogies for it in the history of India. When Baber broke out through the north-western passes, his motley following of some 12,000 included presumably only the fighting men and professional robbers of his country, but within 100 years these same robbers had learnt to appreciate the arts and luxuries of the race they subdued, and were employing the most skilful artisans in the conquered country in the creation of architectural triumphs which even now remain unequalled.

The next question is, what was the age of this civilization the Northern races found in existence, and whence had it come to them? When the Spaniards first came to the new continent, they found the wreck of monastic institutions and the sign of the Cross still in existence. Admiral Brine having personally inspected the ruins of these buildings, having noted the climate and the state of preservation of their materials, particularly of certain wooden lintels, inclines to the conclusion that they are in no case earlier than the 12th century, and owe their origin to the advent of certain exiled Christian apostles from Europe, the tradition of whose arrival still exists. We confess on this point we should like further evidence. One cannot look at the illustrations of his work without being struck by the general family resemblance the ornamentation, particularly, bears to the work of the temples of Nagkon Wat, in Cambodia, the prehistoric remnants of Easter Island, and other Buddhist remains throughout India. Monastic institutions were also not unknown in the East, and the corbelled entrances characteristic of Eastern architecture, generically so different from the true arch of Roman civilization, seem to us hard difficulties to surmount. The scarcity of these remains and the relative absence of *débris* is a strong point in his favour, but against this we must set the comparatively unexplored nature of the district in which they are found.

Finally we have to deal with certain prehistoric forts still remaining in Northern America, octagonal, square, and circular entrenchments, so accurately laid out that their execution by an uncivilized race seems practically impossible. To lay out such works requires geometrical knowledge of a high order, if not the possession of accurate mathematical instruments, which can hardly be imagined as available to

the race that overran the Mexican civilizations. Whence came this knowledge? The Admiral answers by pointing out that the great antiquity of these works only rests on negative evidence, and suggests that they need not be old at all, but may well have been constructed under the guidance and direction of foreigners in relatively modern times, and to us this suggestion appears most reasonable.

F. N. M.

The Camel: its Uses and Management. By Major ARTHUR GLYN LEONARD, late 2nd East Lancashire Regiment. London: Longmans, Green, and Co., 1894. Price 21*s.*

We can sincerely recommend this book. Major Leonard, whose experience extends over 16 years in India, Afghanistan, Egypt, and the Soudan, has collected an amount of information on his subject that should prove of the greatest value to all officers on service, &c., information too which had it been generally circulated 20 years ago might have saved an immense amount of suffering, both human and animal, an almost incredible waste of public money, and, in our opinion, at least one terrible disaster. It would be of great service to the army if Major Leonard would prepare and have printed on thin paper a *précis* of the main points to be attended to in the management of camels, &c., on the march, for issue to officers in the field.

F. N. M.

Across Tibet. By Captain HAMILTON BOWER, 17th Bengal Cavalry. London: Rivington, Percival, and Co., 1894. Price 16*s.*

Captain Bower's book is unfortunate in coming so soon after two such brilliant works of travel in somewhat similar districts as Mr. Knight's "Where Three Empires Meet" and Mr. Conway's "Climbing in the Himalayas;" but those who look for matter more than for literary finish will not be disappointed. Captain Bower with Dr. Thorold Rogers marched out of Leh on the 14th of June, and from thence until the 12th December wandered about over the highest and most barren plateau in the world, rarely descending below the altitude of Mont Blanc, exposed to great hardships from the intense cold and the hostility of the marauding gangs of "Chukpas," and the obstruction of the Tibetan priests. The net result of their labours has been to fill in and fix with accuracy points on the map which were hitherto either quite blank or purely conjectural. The map accompanying the book is well executed and clear, and the vertical section along his route is particularly useful and interesting.

F. N. M.

Schools and Masters of Fence. By EGERTON CASTLE. London: George Bell and Sons, York Street, Covent Garden, 1885.

In view of the reviving interest displayed in swordsmanship and fencing throughout the country, it seems opportune to call attention again to this excellent and little-known work. It is clearly written, free from technicalities incomprehensible to the uninitiated, and, to the best of our knowledge, is the most complete history of the evolution of the sword and swordsmanship at present accessible to English readers. The illustrations are of a very high order, both of quality and interest, and the work should lie on the table of every fencer and of every regiment throughout the service.

F. N. M.

L'Escadron des Cent Gardes. Par GILBERT VERLY. Paris: Ollendorf, 1894. Price 7*s.* 6*d.*

This work gives details of great interest as to life under the Second Empire, and as regards the campaign of 1870 and events within Paris it will be found useful. Amongst other points we note the absolute contradiction given to certain picturesque details of Zola's "La Debâcle," in which the brilliant appearance of the Cent Gardes in helm and cuirass is dwelt on at length. As a fact these articles were all returned into store before the Cent Gardes took the field. We mention this because, owing to the exaggerated praise bestowed on Zola's work by reviewers unacquainted with the campaign, his book has been accepted as evidence

by a very large number of people, whereas as a fact it bristles with points of error, and is distinctly misleading to the student. F. N. M.

Geschichte des Niederrheinischen Füsilier-Regiment No. 39. 1818 *bis* 1893. Von W. Kinleten. Berlin: Mittler, 1893. Price 11*s.* 3*d.*

This history is especially worthy of attention, as the regiment to which it refers took a prominent part in the campaigns of 1866 and 1870. It was present at Gravelotte, and took part in the attacks directed across the Mance Ravine against Point du Jour and the quarries surrounding that place—attacks which have been so carefully analysed by Captain Hoenig in his "Twenty-four Hours of Moltke's Strategy, and Combats round the Quarries around Rozerieulles and Point du Jour," a full *précis* of which, by Major Western, will be found in the December number of this Journal, 1893. F. N. M.

Die Schlacht von Orleans, am 3. *und* 4. *Dezember* 1870. Von Kunz, Major a.D. Berlin: Mittler. Price 4*s.* 6*d.*

A book that contains much material for useful reflection for us in England. An army mustering some 180,000 combatants animated by a high degree of national pride, fighting for hearth and home, led by able and brave soldiers, armed with a weapon far superior to that carried by their adversary, supported by heavy siege guns, entrenchments, and indeed all that the science of th- day could do for them, in fact, enjoying every possible relative advantage that the warmest believers in our Volunteer and Militia forces can claim for them, was defeated and dispersed in two days' fighting by less than half their number of German troops, badly armed, not particularly enthusiastic, and with the sole advantages that the men had been taught for two to three years to stand steady in the ranks and to obey orders, whilst their leaders had learnt by practice to "play together" like a good polo team. That disciplined war-seasoned soldiers can deal with almost indefinite odds of mob levies we all know and admit. What is important here to note is, that though the French were by no means mere mob levies and the Germans were certainly not war-seasoned professional soldiers, in the sense in which the term was used in the old Napoleonic days, yet the habit of mutual co-operation amongst the higher ranks and of obedience amongst the men overweighed all other drawbacks under which the latter laboured, and ultimately enabled them to break up and disperse their enemy at a cost of human life to themselves of only 2¼ per cent. for two days' fighting.

The French losses have never been adequately tabulated—probably never will be. Major Kunz puts them as high as 5,000 killed and wounded, which, distributed over 180,000, gives 2·8 per cent. about, of which at least one-half must have been incurred in retreat.

It follows, therefore, that on a broad average the utmost cohesion to be expected from brave men, well armed, bravely led, fighting for their country, backed by fortifications, heavy guns, &c., *but* organised in a hurry and directed by politicians, will be burst asunder and wrecked by a loss of about one man per company every other day, and this not because the men are individually wanting in courage, but because inefficient organisation paralyses their energy. F. N. M.

Valenciennes (1793). By Arthur Chuquet. Paris: Léopold Cerf, 15, Rue de Médicis. Price 2*s.* 8*d.*

This book is very readable, and of considerable importance to the student of infantry tactics. The point to be settled is whether the "Line" is superior as a formation to skirmishers and small columns or the converse, and the solution is by no means as simple as it may appear to be. In the Seven Years' War, the principle of the "Line" proved everywhere victorious. In 1793-94, French revolutionary armies fighting in skirmishers and small columns defeated the allies, using almost exclusively "Line" formations. At Jena, the "Line" was completely shattered by skirmishers and small columns—but again throughout the Peninsula and Waterloo the "Line" formed of British troops invariably defeated the skirmishing tactics employed against them. There had been no change in infantry arma-

ment (according to some tacticians the essential conditioning factor of formations) during the period, but there had been a colossal and unprecedented revolution in the methods of conducting war and raising troops, which necessitated, in the nations affected by it, an alteration in their tactical methods. To appreciate the problem, evidence is required which will demonstrate the quality of the fighting men supplied to the armies under the new system, and this evidence is to be obtained from the pages now before us, and from similar works by the same pen. At the same time it is necessary to note the causes at work in the allied armies tending not only to paralyse the superior direction of their operations, but also to the gradual deterioration of their fighting material.

For convenience we add a short list of important books bearing on this question. It does not of course pretend to be exhaustive.

Scharnhorst's papers edited by FREIHERR v. DER GOLTZ. Dresden: Carl Höckner, 1885.

Entwicklung der Allgemeinen Ursachen des Glück der Franzosen in dem Revolutionskriege und insbesondere in dem Feldzuge von 1794.

Jena and Roszbach, VON DER GOLTZ, originally published as supplement to the "Militär-Wochenblatt." Berlin: Mittler.

1806 and 1807, by LETTOW VORBECK. Berlin: Mittler.

La première Invasion Prussienne. Vatmy. La Retraite de Brunswick. Jemappe et la Conquête de la Belgique. La Trahison de Dumorier. L'Expédition de Custine. Mayence. Wissembourg. Hoche. By A. CHUQUET. Paris. Price 2*s.* 8*d.* per volume. F. N. M.

The Rise and Expansion of the British Dominion in India. By Sir ALFRED LYALL, K.C.B. London: John Murray, 1894.

This book can be most warmly recommended to all officers serving in India who are desirous of information concerning the rise of the dominion whose power they represent. It is sometimes asserted that the average British officer cares for none of these things, and will not study unless you drive him. This is by no means our experience. The young British officer is distinctly keen to acquire useful knowledge, but, as a rule, he has a practical desire to obtain some result for the time and labour he bestows, and when, owing to the ponderous nature and confused arrangement of the authorities at his disposal, study only involves him in an intellectual maze, he relegates the books to the dust-heap and goes out to kill something, hoping by the use of his eyes and powers of observation to glean some knowledge that may prove of service to him.

Sir Alfred Lyall's work is precisely the kind of broad generalisation that has always been required. It enables one to follow step by step the evolution of the Empire, and then to trace out the bearing of the events in the district, in which one may happen to be serving on the whole plan. Unlike Professor Seeley, in his "Expansion of England," Sir Alfred is not of opinion that we blundered into our inheritance without plan or design. On the contrary, he shows us that the governing power for the time being was at all times very distinctly conscious whither their steps would lead them, though they certainly were averse to taking those steps prematurely. Practically speaking, each step in advance has been forced on us by the necessity of counteracting the avowed designs of France and Russia to oust us, and the successful execution of them was only rendered possible by our command of the sea.

With this view we are all nowadays familiar, thanks to the works of Captain Mahan, but it is worth pointing out that both Professor Seeley and Sir Alfred Lyall, writing many years before the publication of his books, saw the point distinctly enough, and that from the first the nation and its Government were perfectly aware of its significance. But if it was important then, when a six months' voyage separated us from our base, how much greater must the value of sea power be now, when the time of transit has sunk to barely three weeks. F. N. M.

The Tactiks of Aelian; or, Art of Embattailing an Army after the Grecian Manner. Englished and Illustrated with Figures and Notes upon the Chapters by Jo. BINGHAM. London, 1616.

We are indebted to Major Beaumont, late 14th Hussars, for this exceedingly valuable addition to our library, which, to the best of our belief, is the very first drill book ever used in the British Army.

Its origin is as follows, and for this information we have to acknowledge our indebtedness to Max Jähns, the author of the "Geschicht der Kriegswissenschaften vornehmlich in Deutschland," in 1890:—

About the end of the sixteenth century the need of some prescribed regulations for handling an army in the field became universally felt. At the moment attention was being chiefly directed to the works of Greek authors, or rather to those who wrote in Greek—Polybios, Xenophon, Aineias, and Aelian, and the chief centre where these works were studied was at the Courts of Prince Maurice of Orange and Graf, Wilhelm Ludwig of Nassau. An English officer, serving with the States General of Holland, undertook the translation and commentary of Aelian's work, dedicating it to General Maurice of Nassau, Prince of Orange, Governor-General of the United Provinces, who had been brought up on these Greek traditions, and had made them the foundation of his own methods of organisation and employment of the troops under his charge, and to this translation and appendix we owe our first recognised drill book.

The best idea of its scope and quality may be arrived at from the following summary of its contents—we preserve the original spelling:—

1. Authors that have written Tactiks. 2. The praeparation of warlike forces. 3. The framinge of a Phalange. 4. What a file or Decury. 5. The ordre and partes of a file. 6. Of joyning files. 7. Of a Phalange, the place of the armed foote, of the light-armed, and of the horse. 8. The number of the armed foote, of the light-armed, and of the horse. 9. The names of the several partes of the Phalange. 10. The officers of the Phalange. 11. The distances to be observed in the Phalange. 12. The arming of the Phalange. 13. The worth of the file leaders. 14. Of the Macedonian Phalanx and the length of the souldiers' pikes. 15. The place of the light-armed. 16. The names of the bodies of the light-armed. 17. The use of the light-armed. 18. The fashion of horse batailles. 19. Where "Rhombes" were first brought into use. 20. The place of the horsemen in the field. 21. The diligence to be used in choise. 22. Of charriots. 23. Of the elephants. 24. The names of the militarie Notions, etc. 49. Of the placsium. 53. Of silence. 54. The manner of pronouncing the words of commands. The work is abundantly illustrated with plates showing the soldier in the dress of the beginning of the seventeenth century. The following formations are represented:—The "Dilochy" (two files = 16 men); "Tetrarchie," four files; "Taxis," eight files; "Syntagma," 16 files; and "Phalangarchie," 256 files. The term "distance" is used to cover both "distance and interval" in modern phraseology, and three orders were recognised—"Ordinary," or 6 ft. from file to file and between ranks; "Densation," or closing men at 3 ft. distance and interval; and "Constipation," or closing men shoulder to shoulder and 3 ft. between ranks.

The cavalry formations are very quaint, not to say complicated. "Rhombe," a square with one angle directed towards the enemy, and permitting of the following variations duly figured. "Rhombe neither filing or ranking," "Rhombe filing but not ranking," "Rhombe ranking but not filing." The wedge-shape order of attack is also shown, and a plate is devoted to the countermarch by ranks and the "Chorean cauntremarche." The appendix forms our proper drill book. "The exercise military of the English in the service of the high and mighty Lords, the Lords of the Estates of the United Provinces in the Low Countries by the ordre of that great General Maurice, Prince of Orange, etc." The infantry are divided into pikemen and musketeers, and the horse into harquebusiers and curassiers. The manual for the pikes was—"For the pike with a firm stand," "Advance your pikes," "Order your pikes," "Slope your pikes," "Charge your pikes," "Order your pikes," "Traile your pikes," "Cheecke your pikes." On the move, the

following words were in addition:—"Charge your pikes," "Slope your pikes," "To the right hand charge your pikes," "Slope your pikes," "To the left hand charge your pikes," "Slope your pikes," "Charge your pikes to the reare," "Slope your pikes," "Order your pikes." The firing exercise for the muskets contained only three orders—"Make ready," "Present," "Give fire." We may add that the command "As you were" seems to have been as fashionable then as in the present day.

F. N. M.

The Art of Horsemanship. By XENOPHON. Translated, with Chapters on the Greek Riding Horse, and with Notes by MORRIS H. MORGAN, Ph.D., Assistant-Professor in Harvard University. London: J. M. Dent & Co., 1894. Price 3*s.* 6*d.*

In view of the great importance now attaching to a classical education for entrance into the army, we feel some diffidence in recommending a translation of a simple Greek work to our brother officers. No doubt most of them will already be familiar with this little work, and have enjoyed its full flavour, before graduation, in the original. Nevertheless there may be some few, like the writer, keen about horses and all relating thereto, to whom Greek, except in its modern form, is a sealed book. These, we feel assured, will join us in wishing the best of luck to this little work, and in regretting that the author has not seen his way to enlarging the pictorial part very largely. As a matter of fact, and for reasons given above in a notice of Aelian's tactics, we modern tacticians owe a very great deal to our Greek-writing forerunners. Though the Roman maniple, *i.e.*, the company column, had justified its existence many hundred years previously as against the Phalanx or massed brigade column, it happened that the task of explaining the merits of tactical formations remained in the hands of Greek writers for centuries after their nationality had practically ceased to exist. We have borrowed much from these ancient writers, but we might have borrowed more, to greater advantage from their principles of horsemanship than from all the rest of their lore. For the nature of horses on which horsemanship depends never changes, and it would be hard to find shrewder or more sensible counsel as to the management and training of the war-horse from the pages of Rosenberg, or our own cavalry regulations, than we meet with in this work of a long-forgotten writer. There seems little connected with the art of controlling a horse, or even of buying him, that Xenophon did not know, and how admirably the men of his time were taught to sit their mounts, some of these illustrations abundantly prove. It is only to be regretted that the translator did not extend his researches over a wider area, embodying in them all that can be gleaned from the Vase Room of the British Museum. Whilst about it he might have wandered down into the Nineveh Galleries and have reproduced for us about the most spirited little scene of horse action with which we are acquainted. The Greeks rode cobby "tats," 12 hands or thereabouts. The Ninevites were evidently a more sporting race, and their mounts are thoroughbred racing ponies, 13·3s., with sinew and blood showing in every line of them. In the particular relief to which we refer, we have the sort of picture so common to us in India—a rajah's string of ponies being led out to exercise by their syces. One of them has turned "bobbery," and is dragging his groom along, who is hanging on hard by the head rope. To learn how these contemporaries of Nebuchadnazar bred and trained their horses to such perfect development of muscle and bone would be interesting and have money in it, and, doubtless, a careful research amongst the Babylonian and Ninevite bricks would reveal their secret.

F. N. M.

Military Sketches of the Ghoorka War in India in the years 1814, 1815, 1816. WOODBRIDGE. Printed by J. Loder for R. Hunter, 72, St. Paul's Churchyard, London, 1822.

The Letters of Civis on Indian Affairs from 1842 *to* 1849. By HENRY RUSSELL. London: John Murray, 1850.

The Wellington Manual: being a compilation from the Despatches of His Grace the Duke of Wellington, embracing his sentiments on various points relating to Military Discipline and Administration, the Equipment of Armies for the Field, their Management in Foreign Countries, &c. By J. H. STOCQUELER, Editor of the "Calcutta Englishman." Published under the patronage of His Excellency General Sir J. Nicolls, K.C.B., Commander-in-Chief of the Indian Army. Calcutta, 1840.

We have much pleasure in acknowledging the presentation by Colonel W. H. M. Jackson (late 87th) of these three very valuable pamphlets, which will be found to be of great interest to all students of the periods to which they respectively refer.

Of the Ghoorka Wars, dealt with in No. 1, no connected history exists, though the operations under Sir David Ouchterlony are amongst the most successful which we have undertaken. This little work shows that Sir David was essentially a strategist after Moltke's own heart, thoroughly appreciating that, "art in war" consisted in the practical adaptation of the means available to the end in view. The author's comments on the native troops, and his views as to the necessity of augmenting the proportion of British officers, deserve the closest attention.

The letters of Civis are of a more general and political interest, and call for no special remark. But the last on the list, "The Wellington Manual," is so admirable in design, that one can only regret that the idea was not worked out on a far wider scale. There have been compressed editions of the Wellington despatches almost without number, but the idea of collecting the Duke's opinions on military matters and classifying them according to subjects, alphabetically arranged, appears to us novel, and well worthy of imitation and amplification. F. N. M.

English Army Lists and Commission Registers. Vol. II, 1685—1689. By C. DALTON, F.R.G.S. London: Eyre & Spottiswoode, 1894.

Students of military history will readily admit the difficulties which they have encountered in endeavouring to trace the names and commissions of officers in the army prior to the middle of last century, when official Army Lists first made their appearance. If Mr. Peacock's lists of the Cavaliers and Roundheads be excepted, Mr. Dalton becomes one of the first enthusiasts who have made any attempt to fill this vacuum in army literature. Certainly no one but an enthusiast would have undertaken a task so laborious, so thankless, and so unremunerative. His first volume dealt with the period 1661 to 1685, and though full of interest to military readers and well received by the Press, few copies were sold. It is the more, therefore, to Mr. Dalton's credit that he has persevered in producing a second volume, which covers four of the most eventful years in English military history, viz., from the accession of James II on 6th February, 1685, to the 13th February, 1689, when the Marquis of Halifax tendered the Crown to the Prince and Princess of Orange. An interesting feature in this volume is the list of the field officers and captains of the renowned English and Scots Brigades who accompanied William from Holland. In it is to be found Colonel Tollemache's regiment of foot (now the Northumberland Fusiliers), and Colonel Belasyse's regiment of foot, the predecessor of the present Royal Warwickshire Regiment.

In the lists of commissions given in detail between 1685 and the vacation of the throne by the unfortunate James II at the end of 1688 are to be found many regiments, now well known in the British Army, which will doubtless be studied with much interest.

Even in the brief period of that monarch's reign, though he failed in his attempted corruption of the army, he managed to leave his mark in the introduction of two abuses which maintained until the nineteenth century. The first was the conferring upon the captains of the foot guards the rank of lieut.-colonel in the army, with the object of ingratiating himself with them. The second was the practice, from an equally good motive, of granting sinecure commissions to children. Mr. Dalton quotes an instance in point, when James conferred a commission as captain in the Royal Scots upon George Lord Ettrick, only son of his favourite General, Lord Dumbarton. The age of this "officer" on receiving his first commission in 1688 was 18 months. One of the first in after years to put his

foot down upon this evil was the Duke of Marlborough, from a perusal of whose life we gather that he sternly refused to appoint General Brudenell's son to a commission when five years of age, though he made an exception in the cases of boys capable of service. A century later Marlborough's policy was very general, and it may be news to readers of this journal, and possibly to Mr. Dalton, to know that the late Field Marshal Sir William Gomm and his three brothers were ensigns at nine, eight, and seven years of age respectively. Sir Thomas Willshire was an ensign at six, and serving abroad before he was nine. Sir Charles Napier and Lord Keane were commissioned officers at 11, while Lord Hardinge, Lord Gough, Picton, and others were, like Turenne and Blucher, officers before they were 14.

The value of Mr. Dalton's second volume is considerably enhanced by the interesting introductory chapter, while the biographical and explanatory notes are invaluable. Their compilation must alone have necessitated much research. It is devoutly to be hoped that Mr. Dalton's labours will not be thrown away, but that his second interesting volume may find a place in all Service libraries.

R. H.

The British Mission to Uganda in 1893. By the late Sir Gerald Portal, K.C.M.G., C.B., the British Commissioner. Edited with a Memoir by Rennell Rodd, C.M.G. With the diary of the late Captain Raymond Portal, and an introduction by Lord Cromer, G.C.M.G. Illustrated from photographs by Colonel Rhodes. London: Edward Arnold, 37, Bedford Street, W.C., Publisher to the India Office, 1894. Demy 8vo. Price 21*s.*

This most interesting addition to African literature gives a simple and yet most vivid account of the expedition sent to Uganda by the British Government in 1893, to "report on the situation" in that country in view of arriving at a decision on the question of its annexation or abandonment. Owing to the lamented death of Sir Gerald Portal, the accomplished leader of the expedition, the narative has been edited by his friend, Mr. Rennell Rodd, C.M.G. During Sir G. Portal's absence, Mr. Rodd occupied his place as Consul-General, at Zanzibar, and was thus able to assist the expedition in many ways. Besides that Mr. Rodd's official position gave him an intimate acquaintance both with the details of the undertaking and with the ways and customs of the country. It follows that the editor speaks as an authority, and that his remarks, where inserted, are everywhere to the point and of great interest.

In the "Editor's Preface" Mr. Rodd gives a clear account of the various sources from which the materials of the book have been drawn. This is succeeded by an introduction written by Lord Cromer, and by a short biography of Sir Gerald Portal prepared by Mr. Rodd. The narrative of the expedition which follows is divided into three parts. The first of these consists of eight chapters written by Sir Gerald Portal himself during his journey; the second contains a series of extracts from Sir Gerald Portal's diary and private letters, with connecting links and notes supplied by the editor, and the third part is devoted to the diary of Captain Raymond Portal, which is prefaced by an introductory memoir prepared by the editor. The book closes with a well-written epilogue, which gives a well-deserved tribute to the memory of the two brothers who form the central figures of the narrative.

The introduction by Lord Cromer contains a short, but interesting, sketch of the promising career of Sir Gerald Portal, and gives to the world at large the opinion which was held of him in the highest official quarters None who knew Sir Gerald will fail to lament his premature removal from the social sphere of which he was such an ornament, and all Englishmen who love their country will feel the loss of one who was so thoroughly devoted to its service and was so well fitted to uphold its name.

The memoir by Mr. Rodd contains a full account of the details of Sir Gerald's career, including a short history of his expedition to Abyssinia and of his work as British agent at Zanzibar. The first six chapters written by Sir Gerald are devoted to the journey up to Uganda. After the great number of books of African travel lately published it might have been thought that it would be difficult to write any-

thing of interest on such a subject. But Sir Gerald's narrative of his journey is written in such an entertaining style, and his descriptions of the people and country are so clear that the reader is forced to be interested, and will receive from its perusal a vivid impression of real African life. Anyone who has travelled in Africa will realise at once the excellence with which the details of the journey, the customs of the inhabitants, and the phases of African scenery are described. Chapter VII gives a short survey of the country between the coast and Lake Victoria, and enters into the question of transport. Chapter VIII is devoted to an account of the Kingdom of Uganda, its government, people, and country. These two latter chapters are of special interest. Written on the return journey without books of reference they show how thoroughly Sir Gerald had mastered the details of the subjects on which he was ordered to report to the Home Government.

The first two chapters of the second part give the history of the Mission during its stay in Uganda. Although only extracts from a diary and private letters, they give a clear idea of the difficulties which had to be overcome. The second chapter of Part II, which relates to the sad death of Captain Raymond Portal, is the most pathetic part of the whole book, and gives a view of the sad struggle between life and death now being carried on all over the Dark Continent by those who are labouring for its welfare. Another "side" of Sir Gerald Portal's character is here brought out.

The final chapters of Part II relate to the return journey. This is specially interesting to geographers, as a part of the route lay through a country previously untraversed by Europeans. Here we find a very interesting account of the journey from Kikuyu to the Tana, and of the descent of that river in canoes. The march between Kikuyu and Hameye, at the head of the navigable portion of the Tana, presented considerable difficulties, as there was no path, and a way had to be forced through the long grass and swamps, mixed with thick jungle. Game was plentiful, and as a rule a good supply of meat was available, but grain and flour were not procurable, as the country was nearly uninhabited. On the Tana the party had considerable difficulties in collecting canoes. The natives were shy, and at first refused to trade, stating that they had been previously ill-treated by a white man. Moving down the river, at first partly in boats, and partly marching on the bank, for a few days, they were ultimately able to collect a sufficient number of canoes for the whole party. But even then their troubles were by no means over. The canoes were small and rickety, and were constantly being upset by the snags in the river. Sir Gerald lost his bed, and had for the remainder of the journey to sleep on the ground. This accident, no doubt, did much to undermine his health, which had been already severely tried. On the 22nd October, the party arrived at the mouth of the Tana, whence they marched to Witu. The letter at the end of the Chapter, from Sir Gerald to Lady Alice Portal, gives a very readable and interesting summary of this arduous journey.

The last part of the book commences with a short memoir of the life of Captain Raymond Portal, prepared by the Editor, which is followed by Captain Portal's diary in its original form. This is of a very interesting nature, as it gives an insight into the character of the man by whom it was written, as well as much information about the country and people passed through during his journey up.

The illustrations, from photographs taken by Colonel Rhodes, have been beautifully reproduced in this volume and add much to the interest of the book. It is unfortunate that a better map has not been supplied to explain the journey, especially as regards the portion between Kikuyu and the Tana, and that the route of the expedition has not been shown on it. The Anglo-Congolese boundary to the west of Lake Albert Edward is also incorrectly drawn. But these are very slight blemishes in an attractive volume. B. L. S.

A Manual of Naval Architecture. By W. H. WHITE, C.B., Assistant Controller and Director of Naval Construction. 1 vol. 3rd edition. London: John Murray. 1894.

In this new edition of his work on ship-building Mr. White has produced a book which, more than ever, will be looked upon as a standard text-book on the great

subject with which it deals, and which will be cordially appreciated both at home and abroad by all interested in naval architecture. Chapter I deals with the displacement and buoyancy of ships, and contains, among other matters, some very interesting details on "water-tight subdivision in war-ships," and of the recommendation of the Bulkheads Committee, with reference to subdivisions in merchant-ships, contained in their report presented to Parliament in 1891. Chapter II is a short treatise on the "tonnage of ships," dealing with the legislation on the subject from the first Act of Parliament passed in 1423 down to the present time. Chapters III and IV, on the "statical stability of ships" and "oscillation of ships in still water," are naturally of a decidedly technical nature; in the latter half of the fourth chapter Mr. White deals with the question of bilge-keels, and referring to the "Royal Sovereign" and other ships of her class, gives as a reason for not fitting them to those vessels, that "no reasonable depth of bilge-keel would sensibly influence their behaviour." From the good results which appear to have attended the fitting of bilge-keels to the "Repulse," Mr. White would seem to have underestimated their value, as far as regards large battle-ships; for from reports received from the Channel Squadron, after leaving Lough Swilly, while the "Royal Sovereign," Empress of India," and "Resolution" were rolling 34°, the "Repulse" only rolled 10°. The next three chapters are devoted to the consideration of the theories of wave-motions, the oscillations of ships among waves, and various methods of determining the rolling of a ship. Chapter VIII, on the "strains experienced by ships," is of great interest, and Mr. White points out how admirably the ram bow of the "Iron Duke" stood the severe test to which it was subjected when she rammed the "Vanguard"; at the time of the collision the "Iron Duke" was steaming over 7 knots, yet, although she inflicted sufficient damage to sink the "Vanguard," her ram and bows were practically uninjured; in Chapter I Mr. White pointed out the value of what is called the "wing-passage bulkhead," and to this bulkhead he attributed the fact that the "Vanguard" remained afloat for 70 minutes after the collision. In view of these facts, it is most unsatisfactory to recall the serious damage sustained by the bows of the "Camperdown", a comparatively-speaking new ship, when she collided last year with the "Victoria," although she was only moving at the time, we believe, at a speed of barely 4 knots, as against the 7½ at which the "Iron Duke" was going when she rammed the "Vanguard," and that the "Victoria," also built on the most modern principles, sank in 10 minutes, while the obsolete "Vanguard" floated for over an hour. Chapters IX, on the "structural arrangements and strength of ships," and X, on the materials for shipbuilding, are both full of interest, as is also Chapter XI, on the "resistance of ships." Chapters XII and XIII are devoted to the problems connected with the propulsion of ships by sail (in which are embodied the latest investigations of the laws of wind-pressure) and steam respectively. The next four chapters, on the "progress of marine engineering, marine propellers, screw propellers, and steam-ship efficiency," all deserve careful study, and will be found full of interest; on the question of triple screws, Mr. White seems to be of opinion that, until further experiments have conclusively shown that decided economies at low cruising speeds can be effected by the use of triple screws, the balance of advantage lies on the whole at present with the twin-screw system, and he points to the successful results obtained from the "Blenheim" and the two new Cunarders, "Lucania" and "Campania." The work concludes with a chapter on the steering of ships full of interesting facts and the results of various experiments. Mr. White may be warmly congratulated on his new edition, which, we have no doubt, will receive the full meed of merit and attention it deserves.

Modern Strategy. A lecture delivered by Capt. W. H. JAMES, late R.E., before the Military Society of Ireland. Dublin: Dollard.

We wish to call special attention to this very remarkable little paper. Strategy is hardly a subject which can be exhaustively dealt with before a popular audience within one hour, but within the limits assigned him Captain James has succeeded in giving us three-fourths of the concentrated essence of the leading German thinkers. The fourth part he has omitted probably because the Germans generally

omit it themselves; they write for their own people, and to them this fourth part is matter of common knowledge from the lowest rank upwards. Its pith and marrow is briefly this: "The bugle sound 'Stand fast' must find every man and his command in its proper position relative to the other commands around him," a paraphrase of a section in their infantry regulations. This means decentralisation in every rank upwards, and without this decentralisation not even the control of millions and railways to feed them, not even facility of obtaining information can help you. Napoleon's power of direct command found its limit at 100,000 men in contact with the enemy; no other man, except, perhaps, Davoust, could handle 50,000, but the numbers to be handled to-day must be multiplied by ten at least. Scharnhorst saw where universal liability to service must lead. He fell too soon, but Clausewitz took up the thread and Moltke worked it out to its ultimate conclusion, viz., that the million armies of to-day can only be 'manipulated by generals and a staff who can act on their own responsibilty. Our space fails us to deal with this subject adequately. We can only indicate a line of thought and express a hope that those on whom in another thirty years the responsibility of command will devolve will study this lecture carefully, remembering always the limitation, the last sound of the bugle must find them in the right place relatively to their comrades, whether orders have been received or not. This constitutes "command," the other thing is merely "routine." F. N. M.

Kriegsgeschichtliche Uebersicht der wichtigsten Feldzüge der letzten 100 Jahre. Von Adolf Von Horsetzky, k. u. k. General-Major. With 33 plates. 4th Edition. Vienna: Siedel and Sohn. 1894. Price 12*s*. 9*d*.

This book will be found useful for reference by all students of military history. The text consists of a short summary of the different campaigns, and the plans, all worked out to the same scale, show the movements of the different corps engaged clearly and intelligibly. Students for the Staff College will do better to make these diagrams themselves, but for those who are not working for marks, but for practical purposes, these plans will save weeks of labour. The position held by the author is a guarantee for their substantial accuracy. F. N. M.

Paris pendant la Revolution d'après les rapports de la police secrète. 1789—1800. Par Adolphe Schmidt.

Notice sur l'Artillerie de la Marine en Cochin Chine. Col. de Payen. Paris: Berger-Levrault. 5, Rue des Beaux Arts.

Aphorismen über die K. K. Cavallerie von einem Alten Cuirrassier. Vienna: Siedel and Sohn. Price 2*s*.

Useful observations and suggestions on points connected with the Austrian Cavalry.

Zum Studium des Verpflegswesens in Kriege vom operativen Stand pemkt. Von Raimond von Baczyński, with four plates and two maps. Vienna: Kriesel and Gröger, 1894. Price 6*s*.

Valuable studies as to supply in different campaigns.